G. B. C.

CALENDAR

1968-1969

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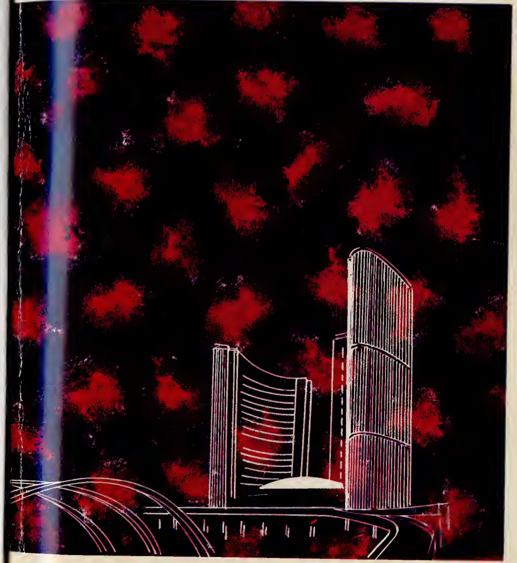
The George Brown College of Applied Arts and Technology

615

CALENDAR 1968-'69



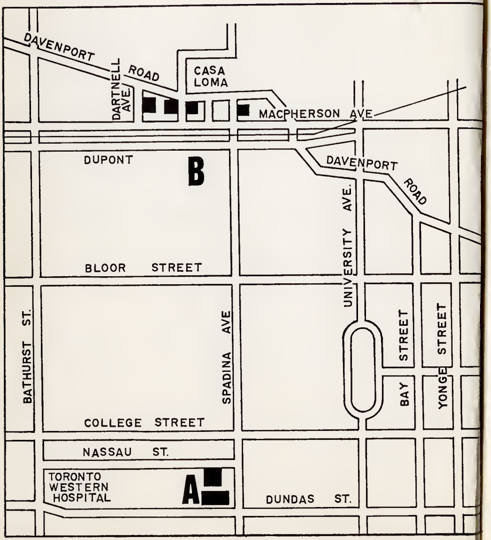
THE GEORGE BROWN COLLEGE
of applied arts and technology

A

21 NASSAU STREET

B

37 DARTNELL AVENUE



George Brown College
# of Applied Arts & Technology
Calendar 1968-69

21 NASSAU STREET,
TORONTO 2B, ONTARIO. 365-5645

As this calendar is published a considerable time before the beginning of the session the College reserves the right to make any changes deemed necessary including the cancellation or addition of programs and courses.

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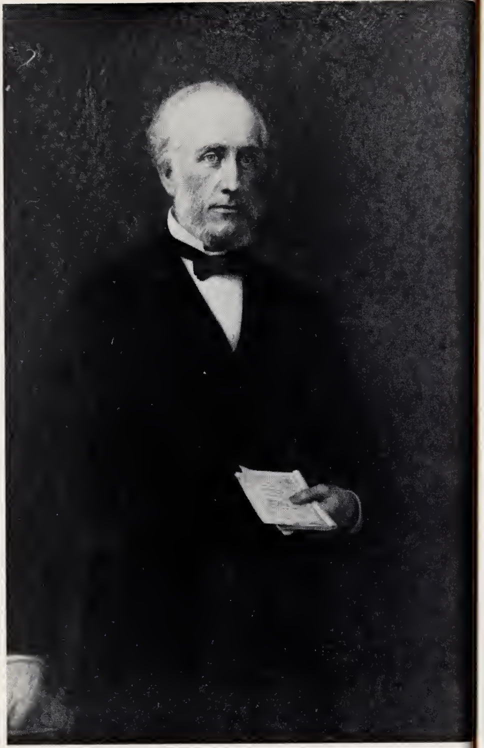

George Brown

George Brown: 1818-1880 Founding Father — Journalist Politician
150th Anniversary, November 29, 1968

Son of Peter Brown, an Edinburgh merchant, and Isabella Mackenzie, George Brown was born forty miles up the Forth at Alloa, November 29th, 1818. He grew up in the Citadel of Scottish Education and within the High School and Southern Academy of Edinburgh.

At the age of twenty, George Brown migrated, with his father Peter Brown, to New York where, in 1842, they established the British Chronicle, a journal for British emigrants. In 1843, the Browns moved to Toronto where they launched the Banner (1843-1848), a Free Church Presbyterian weekly. In 1844 Brown founded the Globe as a weekly, and in 1853, it became a daily.

George Brown was a man of deep convictions. Under his forceful editorship the Globe became a leader of political and educational enterprise. This was manifest when the Globe, in 1853, having absorbed its two main reform rivals, became a daily which acquired an influence unequalled by any Canadian journal since that day.

Through the pages of the Globe, and under the spell of his forthrightness, George Brown dominated the Liberal Party for over two decades.

George Brown opposed all church-affiliated schools. He advocated representation by population, to give large population groups in western Canada their proper place in the Assembly. He ardently advocated the annexation of Hudson's Bay lands. His hastily reorganized Reform Party, which swept the western polls in 1857, was in 1858 put out of power after Brown had ruled two days as Premier of the province.

1864 led George Brown to bold statesmanship when he agreed to enter a coalition government with his Conservative rivals and the day he rose and walked forward to meet Sir John A. Macdonald in the Assembly he made possible the birth of Confederation.

Naturally, strong individualists could not always see eye to eye, and it was a distinct loss when he resigned from the government in 1865. However, he still ardently worked for and supported Confederation until its consummation. Sir John A. Macdonald, political giant that he was, so weakened Brown's leadership by taking able Liberals into his cabinet that in the elections of Confederation year 1867, George Brown was defeated.

George Brown withdrew from active politics, but exercised his editorial power through the leadership given in the pages of the Globe. In 1873, Alexander Mackenzie appointed him to the Senate where his influence was cut short in his sixty-second year by a bullet fired by a disgruntled employee. May 8th, 1880, was coronation day for a great Scot, a commanding journalist, an ardent politician, and a Founding Father.

It is fitting that in the year of Canada's Centennial, the leading Provincial Trade Institutes, themselves pioneers in so many areas of technical technological and apprenticeship training, should become The College of Applied Arts and Technology to bear his illustrious name.

1968

SEPTEMBER

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NOVEMBER

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DECEMBER

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1969

JANUARY

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FEBRUARY

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1969

MARCH

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JUNE

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1969

JULY

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AUGUST

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31						

COLLEGE CALENDAR

CALENDAR OF EVENTS
1968 - 1969

1968

September

3	Registration: All programs one year or shorter in length
3	Registration of Apprentices
9	Registration: All programs two years or longer in length

October

14	Thanksgiving Day: College closed
28	Registration of Apprentices

December

16-20	Mid-term Examinations
20	First Term Ends

1969

January/1969

6	Second Term Begins
6	Registration of Apprentices

March

3	Registration of Apprentices

April

4	Good Friday: College Closed
7	Easter Monday: College Closed
28	Registration of Apprentices

May

5-9	Final Examinations
16	Second Term Ends
19	Victoria Day: College closed

June

20	Completion Apprenticeship Programme

PROLOGUE

The George Brown College is the newest of the community colleges now established in the Province of Ontario and yet it is, in many respects, one of the oldest. It looks back with pride to the pioneering and establishment of many courses, developed in the Provincial Institute of Trades and in the Provincial Institute of Trades and Occupations, which have proven to be of valuable service to the people of Ontario. The College looks forward to ever-increasing opportunities to serve the City of Toronto and to continue, through its highly specialized offerings, to serve the wide community of the Province of Ontario.

Courses in this calendar are presented in two ways. They are described and offered as single course offerings and listed as such at the back of the book. They are also grouped into programs which will qualify the successful student for a particular kind of employment. This arrangement is intended to provide the student with the greatest possible freedom of choice in selecting a program suited to his or her needs.

Courses and programs have stated prerequisites. However, students who are over nineteen years of age and have not achieved the stated entrance requirement may be admitted as mature students. Those wishing to apply under this provision, as well as those who wish to select an unusual program of courses, are urged to seek the advice of a program counsellor.

It will be the continuing ambition of The George Brown College of Applied Arts and Technology to serve, by every means possible, the needs of all sections of the business and industrial community and still pay attention to the individual needs of those who would use its services in pursuit of their own vocational or avocational goals.

C. C. LLOYD, Principal.

THE COLLEGE

HISTORY AND GOVERNMENT

The George Brown College Of Applied Arts and Technology is one of nineteen Community Colleges in Ontario established by the Ontario Provincial Government. It is the Toronto-area Community College and was formed in 1967 by the merging of the Provincial Institute Of Trades and the Provincial Institute Of Trades and Occupation. At that time, governing responsibility was transferred from the Department of Education to a Board of Governors.

The George Brown College is a multipurpose institution offering certificate and diploma programs in technical, applied arts, and business fields.

THE CAMPUS

The physical plant of the college is being expanded to keep pace with the rapidly-growing student enrollments. It is a city campus with several locations in central Toronto and is fully integrated with the life of the city. (See map on the inside front cover.)

THE LIBRARY

The college library, situated on the first floor of the administration building, offers a large selection of modern texts, magazines and periodicals. Students find its congenial atmosphere most conducive to the development of good study habits. The college endeavours to encourage its full use by providing efficient reference and circulation services from early morning until late evening. Some fourteen thousand volumes are available.

THE STUDENT

ADMISSION REQUIREMENTS
APPLIED ARTS, BUSINESS AND TECHNICIAN PROGRAMS

(i) **Programs two years or longer in length.**
The Ontario Secondary School Graduation Diploma with related options awarded after successful completion of any four or five-year program. Secondary School graduates who lack the appropriate options for admission will be required to take a special summer preparatory program.

(ii) **Programs one year or shorter in length.**
The Ontario Department of Education Statement of Standing awarded after the successful completion of Grade 10 of any Four-Year Program. Many of the programs in this category are available under the Ontario Manpower Retraining Program — a government-subsidized educational program for adults. Courses so available are indicated with the program descriptions. Application for a course under the O.M.R.P. can only be made through the nearest Canada Manpower Centre.

(iii) **Admission as a mature student.**
Persons over the age of 19 years who do not meet the admission requirements but who appear to have the capacity and maturity to succeed in the College, will be admitted to an appropriate program as probationary students.

(iv) Admission with advanced standing.

The College grants advanced standing for college-level study completed at other accredited institutions. Students contemplating transfer are urged to study carefully the programs in this calendar to determine the relevance of their present course work to the program desired. A student must be in good standing at the last institution attended to be eligible for admission.

APPRENTICESHIP PROGRAMS

Under an agreement between the Industrial Training Branch of the Department of Labour and the College, apprenticeship programs are offered for REGISTERED APPRENTICES ONLY. For general information, consult the section *Apprenticeship Courses*.

ADMISSION PROCEDURE

Application forms may be obtained from your Secondary School Guidance Office or from the Registrar, George Brown College, 21 Nassau Street, Toronto 2B, Ontario.

Application forms must be accompanied by a $10.00 application fee and ONE of the following documents:

(i) An official transcript of all secondary school marks, showing the necessary credits and grades for admittance to the desired program, *or*

(ii) A statement from the Secondary School Principal stating that the applicant is expected to obtain the necessary credits and grades for admittance to the desired program. This statement must be substantiated by an official transcript of marks when it becomes available.

Mature students (19 years or over) who do not meet entrance requirements but who appear to have the capacity and maturity to succeed in a college program may be accepted as probationary students.

The application fee is non-refundable unless the application is rejected by the Admissions Committee.

All applications are reviewed by the Admissions Committee which is empowered to defer, reject or recommend an alternate program for any candidate whose qualifications in the opinion of the Committee are not adequate to the demands of the program which the candidate wishes to pursue.

REGISTRATION DATES FOR THE ACADEMIC YEAR 1968-69.

(i) All programs one year or shorter in length — Sept. 3, 1968.

(ii) All programs two years or longer in length — Sept. 9, 1968.

A student is not considered duly registered and will not be admitted to classes until all fees are paid in full.

Additional one-year programs will be offered at various times throughout the school year. Starting dates are available upon request.

THE STUDENT'S ADMINISTRATIVE COUNCIL

All students of the College are members of the S.A.C.

Its purpose is to unite the students within a functioning body, which provides opportunity for the formulation, expression and expansion of Student Council.

The S.A.C. endeavours to co-ordinate all phases of co-curricular activity other than the field of Athletics. The S.A.C. represents the Student Body at College functions, and on public occasions. Through its Standing Committees, it organizes such inter-school and College activities as may be of interest to the Student Body as a whole.

The affairs of the S.A.C. are administered by an elected executive, the President of the College, and two staff members.

The following clubs and committees come under the jurisdiction of the S.A.C.

1. The College hockey team, is a competing member of the Toronto Inter-College Hockey League and the O.A.C.C.A.
2. The Camera Club.
3. The Seathan Year Book and Globe Student Newspaper.
4. Social Committee.

ATHLETICS

The opportunity is provided for every member of the Student Body to participate in the Athletic Program.

The Athletic Director operates a highly developed plan for Inter-House League Sports.

Ice Hockey, Table Tennis, Chess, Volleyball, Basketball, Badminton and Floor Hockey are areas of interest.

1967 found The George Brown College entering the O.C.A.A. (Ontario Colleges Athletic Association). This is an Association comprised of several Community Colleges. This College has competent teams entered in the Volleyball, Basketball, and Ice Hockey area. We foresee the additional areas of football, Judo, swimming, track and field being added.

MINOR ATHLETIC CLUBS

Clubs for any Athletic activity may be organized by calling a meeting of interested students, electing officers, and submitting a constitution to the Athletic Director for approval.

REGULATIONS

1. The College does not accept responsibility for injuries sustained by Students intramural or representing sports. Students should see that they are insured with O.M.S.I.P. and O.H.S.C. which covers doctor's services and hospitalization. First aid treatment only is provided at the College health Centre.
2. Students who plan to participate in Athletics should note carefully the following excerpts from the "Regulations Governing Discipline" and from the Constitution of the Athletic Association.
   (a) No one shall be allowed to represent The George Brown College of Applied Arts and Technology in any public Athletic contest, either individually or as a member of any team, *unless* he is a member of the Association.
   (b) The Director shall have full control of the use of the College's name by athletic clubs, and *no* schedule of matches, races, or athletic games,

arranged by a College Club, shall take effect until approved by the Athletic Director.

(c) The Director shall have control and direction of any facilities connected with athletics, and shall make such rules and regulations as are deemed necessary for their management. The Director shall give priority to such arrangements as may be necessary to effect the carrying out of the College regulations requiring physical training.

(d) The Director shall have absolute power to suspend anyone from the privileges of the Athletic Association and also from the right to take part in College Athletics, for any breach of the regulations.

MEDICAL FACILITIES

A Health Centre for the use of students and staff is provided for:

Emergency care for accident and illness occurring at school.

Elective care for illness of a non-acute nature to enable a student to stay at school for the day or to offer him support until he can contact another agency.

Counselling with the nurse on personal or family problems.

Referral to practitioners and special clinics.

Consultation (by appointment) with the Health Centre physician on personal problems.

A broad program of Health Education.

Some miscellaneous services such as, active immunization against tetanus and poliomyelitis, smallpox vaccination, infra-red therapy and facilities for rest.

This Centre is staffed by nurses and physicians who are registered in the Province of Ontario. Medical records are kept in confidence and personal medical information cannot be forwarded to any agency without the consent of the person involved.

Student coverage in case of accidents occurring while in the College.

1. Fee-paying students are covered by School Insurance.
2. Apprentices are covered by Workmen's Compensation.

We recommend that every student to be protected by O.M.S.I.P. and O.H.S.C. Information in regard to these plans is available upon request in the Guidance Centre

MUTUAL RESPONSIBILITY AGREEMENT

The acceptance of a student at The George Brown College Of Applied Arts and Technology constitutes an agreement of mutual responsibility.

The student's part of the agreement is to accept established college rules and practices, to respect the laws of the city and province, and to act in a responsible manner appropriate to these laws, rules, and practices.

The college's part is to provide an environment that encourages student growth and development. The college recognizes that the great majority of students accept and fulfill their part of the agreement. Disciplining action on the part of the college must be taken when a student is persistently irresponsible.

FINANCES

FEES AND EXPENDITURES

The following schedule of fees will be in effect for the academic year 1968-69.

(i) Two Semesters (full academic year)

Application	(non-refundable)	$ 10.00
Tuition		$140.00
Student Council Activities		$ 25.00
Total		$175.00

NOTE: Students making application for the final year of a two or three year program are required to pay a graduation fee of $5.00.

(ii) One Semester

Application	(non-refundable)	$ 10.00
Tuition		$ 65.00
Student Council Activities		$ 12.00
Total		$ 87.00

NOTE: Shorter programs will be calculated on a pro rata basis.

Cheques and money orders for fees should be made payable to The George Brown College Of Applied Arts And Technology.

REFUND SCHEDULE

(i) The application fee of $10.00 applicable to all years will not be refunded unless the application is rejected by the College.

(ii) A student withdrawing prior to the sixth day of instruction in any program will receive a full refund of the tuition fees.

A refund of one-half of the tuition fees will be granted to a student withdrawing on or after the sixth day of instruction, provided such withdrawal occurs within eight weeks. After the eighth week, refunds will only be granted where extenuating circumstances exist and in such cases will be calculated on a pro-rata basis.

ADDITIONAL EXPENDITURES

(i) Textbooks, instruments, and supplies should be purchased by the student as soon after registration as possible.

The cost of such items varies, according to the course, from forty dollars to one hundred dollars. Students are invited to use the facilities of the College book store.

(ii) While uniforms and equipment are supplied to the members of the College teams, such students must be prepared to pay for the incidental expenses incurred on the trips for out-of-town games.

(iii) Students who wish to retain projects constructed in the College must pay for the materials.

FINANCIAL ASSISTANCE

ONTARIO STUDENT AWARDS PROGRAM

Available only to Ontario residents who are registered in courses for which the educational prerequisite is Grade 12 (in general, Technician, Applied Arts and Business Programs).

The purpose of this program is to provide loans/grants to supplement the resources of a student and/or the parents where, in the absence of such aid, a student would be unable to pursue post-secondary education. An award under this program will be made to the extent of the established need in a combination of a non-repayable grant and a Canadian Student Loan. The loan portion is repayable with interest, but no payments are required so long as the student is in full-time attendance at an eligible institution and for six months thereafter. Interest charges during this period are paid by the Federal Government who also guarantee the loan principal.

After the interest-free period, repayment of principal and simple interest-free period, repayment of principal and simple interest charged at current rates on the outstanding balance are required in regular monthly payments to the bank from the borrower. The maximum amount which may be advanced under this program to one student is $1,000.00 in one year. The maximum total indebtedness under this program is $5,000.00.

Application forms are available at the Registrar's Office, The George Brown College, 21 Nassau Street, Toronto 2B, at any time after August 1st.

BURSARIES AND SCHOLARSHIPS

(For a list of financial awards see page 118)

EMPLOYMENT SERVICE

The College assists students in obtaining placement both during the summer vacation and after graduation. This service is under the direction of the guidance and placement officer. Through his office, interviews with prospective employers are arranged and opportunities for employment are brought to the attention of students and graduates looking for positions.

LIVING ACCOMMODATION

Residence accommodation for out-of-town students is not provided by the College, but there is no shortage of boarding and rooming facilities in Toronto. The Guidance and Placement Office of the College maintains a list of boarding and rooming facilities in Toronto. Students are given every possible assistance in finding the type of accommodation suitable to their needs. The classified advertising columns of the daily newspapers are also recommended as an excellent source of information.

Rates vary from $20.00 to $25.00 per week for room and two meals.

The College operates a cafeteria where breakfasts, luncheons, and dinners are provided at reasonable prices.

PARKING AND TRAFFIC

As the College is well served by public transportation, students who use an automobile face problems of congestion and unexpected costs. Reduced fares on the "Go" train are available through the Guidance Department, and students are encouraged to commute by train, T.T.C., and subway whenever possible.

THE CURRICULUM

The George Brown College offers a wide variety of courses leading to vocational competence, to examination and official certification, or to the general enrichment of the individual student. While it is recognized that certain standards of proficiency in particular areas of study are necessary for employment in some vocations, it is also recognized that individual students bring with them to the College certain established abilities, and that their needs differ widely. To provide for the greatest possible flexibility, the calendar describes programs which lead to particular vocations, and courses which make up these programs. Most students will wish to undertake a prescribed program, but others may:

1. Take an enriched program by adding to it another course.
2. Take a light program by omitting one or two courses.
3. Substitute courses for those within a program for which credit has been granted.
4. Take one or two courses at a time with a view to building program credit and certification.

Students who wish to apply for exemption from a course within a prescribed program should do so in writing during or before the first week of attendance at the College.

GRADING AND GRADE REPORTING

The following system of grading is used to indicate the quality of a student's work:

A.	excellent	4 grade points
B.	good	3 grade points
C.	average	2 grade points
D.	below average	1 grade point
F.	failure	0 grade point
WP.	withdrawn while passing	
WF.	withdrawn while failing	
K.	incomplete	

A course in which a student has failed must be repeated if credit is desired. A grade of F is assigned if a student fails to carry out the prescribed procedures when withdrawing from a course or from the College, or if he fails to clear a grade of K in the prescribed time. The grade of K indicates that work is satisfactory as far as completed. It permits the student after consultation with his department head to complete the work in a reasonable period of time. The grade of K is given only in cases of illness or other extenuating circumstances.

Grade Point Average

A grade-point system is used to determine performance. To determine a grade-point average (GPA) divide the total credits earned (CE) by the total credits registered (CR). The number following the title of a course indicates the grade-point value of the course.

$$\text{GPA} = \frac{\text{CE}}{\text{CR}}$$

A minimum grade-point average of 2.0 is needed to complete a program. Students may repeat courses in which a failing (F) or below average (D) grade has been received. Credit for a course is allowed but once in a program; both grades are counted in computing the grade-point average.

Probationary Status

Students who have been accepted but do not meet the published prerequisites for a program, and students who are re-admitted after a failure (a grade-point average less than 2.0) are placed in probationary status. If a probationary student has not achieved a 2.0 grade-point average by the end of the semester, he will be required to withdraw.

Transfer Credits

Students who wish to have courses taken elsewhere credited to the program in which they wish to enrol must apply in writing to the registrar at or before the end of the first week of their course. Their work will be evaluated and credited to their program where applicable.

Supplementals

Application for supplemental examination privileges must be received by the Registrar within one month of the receipt of grades.

Programs of Study

AIR CONDITIONING TECHNICIAN

An air conditioning technician is concerned with the design, maintenance, and operation of air conditioning and refrigeration systems used in public buildings, storage facilities, and manufacturing activities.

The refrigeration and air conditioning industry provides many challenging opportunities. System design layout, equipment selection, contract supervision and sales promotion are among the many areas covered in this industry. Contact with manufacturing and wholesale organizations can widen the scope of interest.

Length of Course .... 2 years
Admission Requirements .... Grade 12

PROGRAM OF STUDY

FIRST YEAR

AIR	100	Principles of Refrigeration	5
AIR	101	Psychrometrics and Load Estimating	3
AIR	102	Refrigeration Lab	3
MATH	100	Mathematics	4
ENG	100	Language and Communication	2
PHYS	100	Applied Physics	3
ELEC	100	Electrical Fundamentals	3
DR	100	Technical Drafting	2
		Total	25 cr. hr.

SECOND YEAR

AIR	200	Refrigeration and Air Condition Lab Practices	2
AIR	201	Control Systems — (Electronic and Pneumatic)	6
AIR	202	Air Conditioning System Design	3
MATH	200	Mathematics	4
ENG	200	Language and Communication	2
MECH	100	Mechanics	3
EC	100	Economics	2
PHYS	201	Thermodynamics	3
		Total	25 cr. hr.

APPLIANCE SERVICING

This course is designed to give a thorough knowledge of the theory and practice required for the maintenance and repair of home appliances. The student should have a high mechanical aptitude. Students are prepared for such occupations as servicemen, factory representative, field representative, appliance salesmen, appliance inspector and production supervisor.

Length of Course .... 1 year
Admission Requirements .... Grade 10

PROGRAM OF STUDY

EL	133	Electrical	6
AP	100	Laundry Equipment	3
AP	101	Kitchen Equipment	3
AP	102	Refrigeration	6
DR	130	Blue Print Reading	1
ENG	101	English	2
MATH	130	Mathematics	3
		Total	24 cr. hr.

BUSINESS MACHINE SERVICING

The work of a Serviceman consists of checking, adjusting, rebuilding, overhauling and cleaning machines. Working conditions are good since servicing is performed in offices and in the service shop.

Since the Serviceman meets many people, he should present a good appearance and have the ability to co-operate with others. The prospective serviceman should have high mechanical aptitude. Good vision and hearing are essential so that operating difficulties may more easily be detected.

Because of the rapid increase in the number and variety of office machines in daily use, prospects in this occupation are excellent for the man who is ambitious and who is capable of working on his own.

Length of Course .... 1 year
Admission Requirements .... Grade 10

PROGRAM OF STUDY

BM	100	Typewriter	6
BM	101	Adding Machines	6
BM	102	Photo-copy	2
EL	111	Electrical	1
ENG	101	English	2
MATH	130	Mathematics	3
DR	130	Blue Print Reading	2
		Total	22 cr. hr.

CHILD CARE WORKER

Child Care Workers are trained to care for and assist in the bringing up of children under substitute home conditions; in institutions, hospitals, schools and group homes.

The course offers a thorough background study of normal child development, child psychology, and deviant and abnormal behavior. In addition, the student is helped to develop an understanding of his own reaction to disturbed or provocative behaviour. Study of health and ill-health deals with levels of health and physical growth; childhood ailments, and psychosomatic conditions. Students gain some understanding of physical handicaps, e.g. blindness, deafness, the crippled, the spastic, and mental subnormality, and the special needs of such handicapped children.

A study of Provincial and private community services is reinforced by visits of observation to agencies and institutions in the city and province. Students are instructed in the Provincial Legislation affecting the welfare, protection and care of children, and in the historical circumstances leading to the creation of welfare agencies and the accompanying legislation.

Program and recreational skills are developed through courses in music, crafts and art. Students are encouraged to equip themselves for working with children as well as to extend their own skills.

Direct supervised experience with children in institutional care occupies two days a week when the student's work is under the direction of field supervisors.

Child Care Workers must develop a mature and accepting attitude towards their fellow men, and an ability to form good inter-personal relationship with other professional persons working with children. Above all, they must be both sensitive and objective in their relations with disturbed, unhappy and turbulent children.

Upon completion of the course, Child Care Workers find employment in Provincial Institutions, Schools and Centres and in private social agencies, group homes and hospitals.

PROGRAM OF STUDY

FIRST YEAR

PSY	161	Child Study I	4
CHI	163	Health and First Aid	2
CHI	162	Social Services	2
CHI	161	Program Planning	3
PSY	162	Psychiatric Seminar	1
PE	161	Swimming and Water Safety	1
CHI	160	Field Practice	8
CHI	164	Professional Development	1
		Total	22 cr. hr.

SECOND YEAR

PSY	261	Child Study II	2
PSY	160	General Psychology (Introduction)	2
CHI	261	Program Planning	2
CHI	264	Professional Development	1
CHI	262	The Therapy of Play	1
PSY	262	Psychiatric Seminar	1
CH	200	Field Practice	12
		Total	21 cr. hr.

CIVIL ENGINEERING TECHNICIAN

The various branches of civil engineering deal with problems in all types of structures: bridges and buildings, piers and docks, highways, railways, and airports; in hydro-electric power development; drainage and irrigation works; in all aspects of municipal development: water supply, sewerage systems, and roads.

The course provides the basic training which leads to positions as technicians with municipal and provincial departments, engineering firms, and construction companies.

Length of Course .... 2 years
Admission Requirements .... Grade 12

PROGRAM OF STUDY

FIRST YEAR

SURV	100	Survey Computations and Drafting	5
SURV	101	Plane Surveying	6
CIV	100	Construction Materials and Methods	3
DR	121	Descriptive Geometry	1
MATH	100	Mathematics	4

ENG	100	Language and Communication	2
PHYS	100	Applied Physics	3
		Total	25 cr. hr.

SECOND YEAR

CIV	200	Structural Steel	3
CIV	201	Concrete	3
CIV	202	Municipal Services	3
CIV	203	Highway Design	3
DR	221	Descriptive Geometry	1
MATH	200	Mathematics	4
ENG	200	Language and Communication	2
EC	100	Economics	2
MECH	100	Mechanics	3
		Total	25 cr. hr.

CONSTRUCTION TECHNICIAN

This course is designed to prepare young men to enter the construction industry in various capacities leading to positions as estimators, expeditors, building inspectors, building products salesmen, field engineers and superintendents. These positions are not seasonal in nature.

Length of Course .... 2 years
Admission Requirements .... Grade 12

PROGRAM OF STUDY

FIRST YEAR

CO	100	Building Construction and Drafting	4
CO	101	Quantity Surveying	5
CO	102	Mechanical Installations	3
CO	103	Construction Materials	2
CO	104	Construction Surveying	2
MATH	100	Mathematics	4
ENG	100	Language and Communication	2
MECH	100	Mechanics	3
		Total	25 cr. hr.

SECOND YEAR

CO	200	Building Construction and Drafting	3
CO	201	Quantity Surveying	4
CO	202	Mechanical Installations	2
CO	203	Contracts and Specifications	2
MATH	200	Mathematics	4
ENG	200	Language and Communication	2
PHYS	100	Applied Physics	3
EC	100	Economics	2
MECH	110	Mechanics of Materials	3
		Total	25 cr. hr.

DENTAL TECHNICIAN

A Dental Technician is a person who alters, repairs or makes any artificial device used by dentists, such as dentures, bridgework, inlays, crowns, metal clasps and orthodontic appliances used for the straightening of teeth.

The dental technician may be employed by one dentist or he may operate a laboratory alone. He may be the owner of a laboratory employing a few or many technicians or he may be an employee in a laboratory owned by an individual or a firm.

The dental technician will find much satisfaction in knowing that he is rendering an essential health service through the dental profession to the public. Another source of pleasure is the infinite variety of the work itself and the artistry and skill involved in its execution.

With the guidance and advice of a committee representing both the Royal College of Dental Surgeons of Ontario, and the Governing Board of Dental Technicians, a three year program of studies is provided. This will include the theory and practice of all aspects of dental laboratory work and will include a related subject program designed to give insight to the problem of small business management. Sixty per cent of the course will consist of practical laboratory work. Students fill prescriptions in a simulated commercial environment and thus develop quality, speed and efficiency, acceptable to the industry and the exacting demands placed upon it.

Length of Course .... 3 years
Admission Requirements .... Grade 12

PROGRAM OF STUDY

FIRST YEAR

DENT	160	Dental Lab I	14
DENT	161	Dental Materials	2
DENT	162	Dental Anatomy	2
ENG	131-134	English elective	3
PHYS	169	Physics	2
CHEM	169	Chemistry	2
		Total	25 cr. hr.

SECOND YEAR

DENT	260	Dental Lab II	14
ENG	201-206	English Elective	2
PHYS	229	Physics	2
CHEM	229	Chemistry	2
MATH	229	Mathematics	3
EC	200	Economics	2
		Total	25 cr. hr.

THIRD YEAR

DENT	360	Dental Lab III	20
MATH	329	Mathematics	3
EC	300	Business Management	2
		Total	25 cr. hr

DRAFTING (GENERAL)

The draftsman is the link between the engineer, architect, or designer and the practical tradesman in the manufacturing plant or on the construction site. In many organizations the drafting room is looked upon as an ideal training ground for administrative and supervisory personnel.

Graduates of this course are employed in architectural offices, mechanical engineering offices, manufacturing and construction industries, and municipal and provincial offices. Students graduating from this course with honours standing will be considered for admission to the Drafting Technician program.

Length of Course .... 1 year
Admission Requirements .... Grade 10

COURSE OUTLINE

DR	141	Mechanical Drafting		4
DR	142	Architectural Drafting		4
DR	145	Structural Detailing		2
DR	150	Descriptive Geometry		2
DR	143	Electrical Drafting	Elective	2
DR	144	Survey		
MATH	130	Mathematics		3
ENG	130	Language and Communication		2
PHYS	130	Physics		3
			Total	22 cr. hr.

DRAFTING TECHNICIAN — ARCHITECTURAL

This course is designed to provide technicians for architect's offices, construction companies. engineering firms, and government departments. The program of instruction is arranged to provide skills in architectural drawing, detailing, and rendering, and modelbuilding; and to provide knowledge of architectural design, contracts, organization, and business relationships.

Graduates find employment as draftsmen, field representatives, building products salesmen, and expeditors.

Length of Course .... 2 years
Entrance Requirement .... Grade 12

PROGRAM OF STUDY

FIRST YEAR

DR	102	Architectural Drafting I	6
ARCH	100	Materials and Methods	3
DR	111	Mechanical Drafting	3
SUR	110	Surveying	2
DR	120	Descriptive Geometry I	2
MATH	100	Mathematics	4
ENG	100	Language and Communication	2
MECH	100	Mechanics	3
		Total	25 cr. hr.

SECOND YEAR

DR	202	Architectural Drafting II	4
ARCH	200	Materials and Methods	2
DR	115	Structural Steel Detailing	2
ARCH	201	History of Architecture	1
DR	220	Descriptive Geometry II	2
MATH	200	Mathematics	4
ENG	200	Language and Communication	2
PHYS	100	Applied Physics	3
EC	100	Economics	2
MECH	110	Mechanics of Materials	3
		Total	25 cr. hr.

DRAFTING TECHNICIAN: ELECTRICAL — ELECTRONIC

This course is designed to train drafting technicians in the fields of electricity and electronics. The training combines an adequate theoretical base, practical knowledge, and workshop skills to provide a background for drafting. In the second year, the student selects either the electronic or electrical option to provide specialization.

Electrical-electronic drafting technicians are employed by provincial and municipal hydro-electric systems, manufacturing companies, engineering firms, construction companies, and government departments.

FIRST YEAR

DR	103	Electrical Drafting I	5
DR	112	Architectural Drafting I	3
DR	111	Mechanical Drafting	3
DR	120	Descriptive Geometry	2
EL	112	Electrical Lab	2
MATH	100	Mathematics	4
ENG	100	Language and Communication	2
EL	110	Electrical Fundamentals	2
ELCT	100	Electronic Fundamentals	2
		Total	25 cr. hr.

SECOND YEAR

ELECTRICAL OPTION

DR	203	Electrical Drafting II	3
EL	201	Electrical Design	2
DR	202	Architectural Drafting II	3
EL	202	Electrical Lab	1
EL	203	Materials and Processes	2
MATH	200	Mathematics	4
ENG	200	Language and Communication	2
PHYS	100	Applied Physics	3
EL	204	A.C.-D.C. Machines	2
EL	205	Power Transmission and Distribution	2
		Total	25 cr. hr.

SECOND YEAR

ELECTRONIC OPTION

DR	205	Electronic Drafting	3
DR	201	Mechanical Drafting	3
ELTC	211	Electronic Design	2
ELTC	212	Electronic Lab	2
ELTC	213	Materials and Processes	2
ELTC	202	Communication Systems	2
ELTC	201	Computer Systems	2
ENG	200	English	2
PHYS	100	Applied Physics	3
MATH	200	Mathematics	4
		Total	25 cr. hr.

DRAFTING TECHNICIAN — MECHANICAL

Machines and mechanical devices of increasing complexity characterize Canadian primary and secondary industry. Every component and assembly of these machines is drawn by a mechanical draftsman. This course is designed to give the theoretical and practical knowledge necessary to meet the Personnel requirements of the many organizations in the mechanical field.

Graduates are employed by consulting engineers, industries, and governments as draftsmen, estimators, inspectors, and salesmen.

Length of Course	2 years
Admission Requirements	Grade 12

PROGRAM OF STUDY

FIRST YEAR

DR	101	Mechanical Drafting	5
DR	112	Architectural Drafting	3
DR	115	Structural Detailing	2
MACH	100	Workshop Technology	2
DR	121	Descriptive Geometry	2
MATH	100	Mathematics	4
ENG	100	Language and Communication	2
MECH	100	Mechanics	3
EL	100	Electrical Fundamentals	2
		Total	25 cr. hr.

SECOND YEAR

DR	201	Mechanical Drafting	3
MECH	202	Mechanisms — Analysis and Design	2
MACH	201	Industrial Processes	2
DR	220	Descriptive Geometry	2
MATH	200	Mathematics	4
ENG	200	Language and Communication	2
PHYS	100	Applied Physics	3
EC	100	Economics	2
MECH	110	Mechanics of Materials	3
MET	100	Metallurgy	2
		Total	25 cr. hr.

ELECTRIC MOTOR REPAIR

This course is designed to meet the specific needs of industry in a specialized electrical field, needs which previously established courses for electrical technicians or tradesmen have not satisfied.

In addition to providing the student with a sound basis in electrical theory, the course involves a detailed study of the principles of the construction and operation of D.C., single phase and three phase motors. In the shop, the student is taught how to locate and identify faults and how to dismantle, re-wire and reassemble stationary and rotating electrical equipment.

The knowledge and skill acquired during the course prepares the student for employment in electric motor production plants and servicing shops.

Length of Course	5 months
Admission Requirements	Grade 10

SEMESTER I

EL	140	D.C. Motors	3
EL	141	Single Phase Motors	5
EL	142	Three Phase Motors	5
MS	144	Machine Shop	2
PHYS	155	Physics	2
MATH	155	Mathematics	4
ENG	155	English	2
		Total	23 cr. hr.

ELECTRICAL TECHNICIAN

This course is designed to provide the theory, skills, and knowledge of industrial practices required of an electrical technician. Facilities include modern labs and equipment which reinforce electrical theory with practical experience. Opportunities for employment are found in electrical generation and distribution, communications, manufacturing, and building fields. Graduates are employed as draftsmen, servicemen, estimators, operators, and inspectors.

Length of Course	2 years
Admission Requirements	Grade 12

FIRST YEAR

EL	101	Electrical Measurements	2
EL	102	D.C. Machines	4
EL	103	Electrical Lab	4
EL	104	Electrical Fundamentals	4
MATH	100	Mathematics	4
ENG	100	Language and Communication	2
PHYS	100	Applied Physics	3
DR	113	Electrical Drafting	2
		Total	25 cr. hr.

SECOND YEAR

EL	200	A.C. Machines	3
EL	205	Power and Distribution	2
EL	206	Industrial Electronics Control	4
EL	207	Electrical Lab	3
MATH	200	Mathematics	4
ENG	300	Language and Communication	2
MECH	102	Mechanics	2
EC	110	Economics	2
DR	203	Electrical Drafting	2
		Total	25 cr. hr.

ELECTRONICS (DOMESTIC)

A graduate of the Electronics (Domestic) course will find a demand for his services in electronic manufacturing companies, retail radio and television stores who maintain their own service department, the Armed Forces, and small radio and television repair shops. It is expected that because of the greatly increased number of colour television sets being sold today, skilled electronics men will be in large demand by the industry. Students graduating from this course with honours standing will be considered for admission to the Electronics Technician program.

Length of Course	1 year
Entrance Requirements	Grade 12

COURSE OUTLINE

ELTC	130	Electronic Theory	8
ELTC	130	Domestic Equipment Lab	7
DR	133	Drafting	2
MATH	131	Mathematics	3
PHYS	131	Physics	3
ENG	130	Language and Communication	2
		Total	25 cr. hr.

ELECTRONICS TECHNICIAN

This course is designed to provide engineering technicians to work in the design, research, production, maintenance, or installation phases of the electronic industry. The College is well supplied with laboratory space and modern equipment. A full range of equipment is available. The course is intensive and consistent hard work is necessary for successful graduation. Graduates of this course have been employed in research and engineering departments of government and industry with utility companies, in radio and television broadcasting, in the oil industry, and in computer and communication systems installation.

Length of Course	2 years
Admission Requirements	Grade 12

FIRST YEAR

EL	100	Electrical Fundamentals	2
ELTC	100	Electronic Fundamentals	2
ELTC	101	Amplifiers	2
ELTC	102	A.M.-F.M. Receiver Circuits	3
ELTC	103	Semi-Conductor Circuits	3
DR	116	Drafting	2
MATH	100	Mathematics	4
ENG	100	Language and Communication	2
MECH	102	Mechanics	2
PHYS	100	Applied Physics	3
		Total	25 cr. hr.

SECOND YEAR

ELTC	200	Transistor and Pulse Circuits	5
ELTC	201	Computer Systems	4
ELTC	202	Communication Systems	3
ELTC	203	Microwave Systems	3
MATH	200	Mathematics	4
ENG	200	Language and Communication	2
PHYS	200	Modern Physics	2
EC	100	Economics	2
		Total	25 cr. hr.

FOOD SERVICE SUPERVISOR

This course is designed to fill the growing need for men and women who are trained in the preparation of food on a large scale. Students are taught to prepare nutritious food in varied and attractive ways, and to purchase and handle supplies so that an establishment may operate at a reasonable profit, observing at all times the importance of cleanliness, sanitation and good public relations.

Successful graduates of this course may look forward to well-paid positions in restaurants, hotel dining rooms, institutions, and catering establishments.

Length of Course	2 years
Admission Requirements	Grade 12 or Journeyman Chef with II class standing

PROGRAM OF STUDY

FIRST YEAR

Semester I

FOOD	100	Introduction to Food Service	1
FOOD	101	Quantity Food Production I	5
FOOD	102	Food Products and Standards	2
FOOD	103	Merchandising	2
ENG	122	English	1
MATH	110	Mathematics	1
		Total	12 cr. hr.

Semester II

FOOD	110	General Orientation	1
FOOD	111	Quantity Food Production	5
FOOD	113	Production Cost Control	2
FOOD	114	Exemplary Supervisory Action	1
FOOD	115	Catering and the Serving of Food	1
ENG	123	Oral and Written Business Com.	1
		Total	12 cr. hr.

SECOND YEAR

Semester I

ENG	210	Advanced Quantity Food Production	1
EC	210	Basic Economics and Industrial Organization	1
FOOD	211	Advanced Quantity Food Production	4
FOOD	213	General Accounting for the Industry	1
FOOD	214	Food Service Operation Supervision	4
FOOD	215	Catering and the Serving of Food	1
		Total	12 cr. hr.

Semester II

EC	211	Basic Economics and Industrial Organization	1
FOOD	220	Management of Food Service Operations	2
FOOD	221	Food Science Laboratory	2
FOOD	223	General Accounting for the Industry	1
FOOD	224	Food Service Operation Supervision	6
		Total	12 cr. hr.

FOOD SERVICE: DINING ROOM SERVICE

Graduates have ample opportunity to select positions from a variety of establishments in the food service industry. Many hotel dining rooms, clubs, railway dining cars, and motels employ only trained personnel or graduates of recognized courses. Many graduates have entered the industry directly as junior managers with restaurant chains. Others find employment in institutions which permit advancement to the positions of captain, maitre d'hotel, assistant manager, manager, hostess or manageress.

Length of Course .... **10 weeks**

Courses are started at 10-week intervals commencing in September each year. Prospective candidates are advised to contact the Registrar's Office for the exact starting date.

Admission Requirements .... **Grade 10 preference**

(a) The Grade 10 prerequisite is waived for this course. Prospective candidates should be well-motivated, have a pleasing personality and a good personal appearance. All candidates must be willing to take a complete medical examination which is administered by the Health Centre at the College. Aptitude tests are available for applicants of marginal ability.

(b) Evening banquet service is considered an essential part of the practical training program. Candidates must be prepared to complete a minimum of 30 banquet hours during the program.

PROGRAM OF STUDY

FOOD	142	Dining Room Service	10
MATH	135	Business Mathematics	1
ENG	141	Language and Communication	1
		Total	12 cr. hr.

FOOD SERVICE: COOK

This course is designed to prepare men and women to enter the fields of professional cooking. This is an excellent opportunity for any person who has completed Grade 10 to enter a challenging trade that pays well and assures full-time employment.

Opportunities to become an apprentice in this field are numerous; graduates of this course, because of their skill and immediate value to an employer, will experience little difficulty in finding an employer of their choice. Graduates of this course are urged to enter the apprenticeship program and complete the requirements necessary for the Provincial Certificate of Qualification as a Journeyman Chef.

Length of Course .... **one semester**

The first semester will begin September 5, 1968. Prospective candidates for the second semester are advised to contact the Registrar's Office for exact starting date.

Admission Requirements .... **Grade 10**

(a) Ontario Department of Education Statement of Standing awarded after successful completion of Grade 10 of any four year program, *or*

A combination of education and experience considered equivalent by the Registrar.

(b) Prospective candidates must have a high standard of personal hygiene and be willing to take a complete medical examination which is administered by the Health Centre at the College.

(c) Evening banquets are considered an essential part of the practical training program. Candidates must be prepared to complete a minimum of 30 banquet hours during the program.

PROGRAM OF STUDY

FOOD	143	Theory of Food	5
FOOD	144	Kitchen Practice	3
FOOD	145	Foods Laboratory	2
MATH	135	Business Mathematics	1
ENG	141	Language and Communication	1
		Total	12 cr. hr.

FOOD SERVICE: RETAIL MEAT CUTTING

Professional meat cutters are employed by the following organizations: independent meat stores, chain store meat departments, hotel and restaurant portion control supply houses, home freezer supply houses and catering organizations. Graduates of this course, because of their skill and immediate value to an employer, will experience little difficulty in finding an employer of their choice.

Length of Course .... **one semester**

The first semester will begin September 5, 1968. Prospective candidates for the second semester are advised to contact the Registrar's Office for exact starting date.

Admission Requirements .... **Grade 10**

(a) Ontario Department of Education Statement of Standing awarded after successful completion of Grade 10 of any four year program.

(b) A combination of education and experience considered equivalent by the Registrar.

(c) Prospective candidates must have a sigh standard of personal hygiene and be willing to take a complete medical examination which is administered by the Health Centre at the College.

PROGRAM OF STUDY

FOOD	140	Meat-cutting Theory	5
FOOD	141	Meat-cutting Practice	5
MATH	135	Business Mathematics	1
ENG	141	Language and Communication	1
		Total	12 cr. hr.

HEATING TECHNICIAN

The Heating Technician course is designed to develop a technician who can estimate, install, service, and sell domestic and commercial heating systems. By theoretical and practical instruction, the course aims to provide a thorough knowledge of the combustion of fuels, automatic controls, systems design, pipe fitting, and maintenance. The successful student will find rewarding employment with oil companies, heating and cooling companies, gas utilities and manufacturers of fuel burning equipment.

In the heating field there is a considerable demand for technical personnel who are knowledgeable in oil, gas and electric heating and cooling systems. This demand has been created, in part, by the expansion of building construction.

Length of Course .... 1 year
Admission Requirements .... Grade 12

Semester I

HT	100	Domestic Oil Burners	2
HT	101	Domestic Oil Burners	3
EL	111	Electrical Fundamentals	1
PHYS	113	Physics	1
MATH	111	Mathematics	2
ENG	111	English	1
DR	111	Drafting	1
HT	141	Domestic Gas Burners	1
		Total	12 cr. hr.

Semester II

HT	110	Heating Systems 100	3
HT	111	Heating Systems	3
EL	112	Electrical	1
MATH	112	Mathematics	2
ENG	112	English	1
PHYS	114	Physics	1
HT	112	Commercial Gas and Oil	1
DR	112	Drafting	1
		Total	13 cr. hr.

INDUSTRIAL PROCESS PIPING AND DESIGN TECHNICIAN

The industrial process piping and design technician is concerned with the design and drafting of industrial plants and piping systems handling continuous-flow materials.

An increasing amount of industrial production comes from automated continuous-flow processes. Processing industries are typified by the manufacture of fuels and petro-chemical products; organic chemicals such as dyes, paints, plastics, synthetics, acid, alkalies, and salts, extraction of metals from their ores, including the processing of atomic energy materials, vegetable and animal oils, fats, and food products, cements and plasters, soap, sugar, and leather.

Length of Course .... 2 years
Admission Requirements .... Grade 12

FIRST YEAR

IND	100	Materials of Construction and Design I	4
DR	104	Piping Systems Drafting I	5
DR	111	Mechanical Drafting	2
IND	101	Building Construction	3
DR	120	Descriptive Geometry	2
MATH	100	Mathematics	4
ENG	100	Language and Communication	2
MECH	100	Mechanics	3
		Total	25 cr. hr.

SECOND YEAR

IND	200	Materials of Construction and Design II	4
DR	204	Piping Systems Drafting II	3
DR	115	Structural Detailing	2
DR	222	Descriptive Geometry	2
MATH	200	Mathematics	4
ENG	200	English	2
PHYS	100	Applied Physics	3
EC	100	Economics	2
MECH	110	Mechanics of Materials	3
		Total	25 cr. hr.

INSTRUMENTATION MECHANIC

Instrument mechanics are required wherever industries are located. These include chemical plants, power plants, steel plants, pulp and paper plants, pipelines, refineries and the instrument companies which make, sell and service the instruments. Instrument men may work as field service representatives in the base plant on manufacture, repair or calibration, or in process plants on instrument maintenance. Students graduating from this course with honours standing will be considered for admission to the Instrumentation Technician program.

Length of Course .... 1 year
Admission Requirements .... Grade 10

PROGRAM OF STUDY

INST	130	Pneumatic Instrumentation	7
INST	131	Electronic Instrumentation	7
INST	132	Installation Techniques	1
MATH	132	Mathematics	3
ENG	130	Language and Communication	2
PHYS	132	Applied Physics	3
MACH	130	Workshop Technology	2
		Total	25 cr. hr.

INSTRUMENTATION TECHNICIAN

The increasing use of automation and automatic processes has resulted in the growth of the specialized field of instrumentation. The instrumentation technician is concerned with measurement and control devices used with complex automatic systems. The program of study presents theory and knowledge of these devices and is aimed at developing technicians who work precisely. Facilities include modern shops and labs and feature a wide range of precision equipment. Instrumentation technicians are employed in government, universities, research and development, manufacturing, and primary industry.

Length of Course .... 2 years
Admission Requirements .... Grade 12

FIRST YEAR

INST	100	Measuring Principles I	3
INST	101	Measuring Principles II	3
INST	102	Control Principles and Telemetry	3
INST	103	Piping and Instrument Lab	2
MATH	100	Mathematics	4
ENG	100	Language and Communication	2
MECH	100	Mechanics	2
EL	100	Electrical Fundamentals	2
DR	100	Drafting	2
MACH	110	Workshop Practice	1
		Total	25 cr. hr.

SECOND YEAR

INST	200	Instrumentation Techniques	3
INST	201	Control Systems Analysis	3
INST	202	Analytical Process Instrumentation	2
INST	203	Computer Principles and Systems	2
MATH	200	Mathematics	4
ENG	200	Language and Communication	2
PHYS	100	Applied Physics	3
EC	100	Economics	2
CHEM	100	Chemistry	2
ELTC	100	Electronics	2
		Total	25 cr. hr.

JEWELLERY ARTS

The occupation of a jeweller is as varied as the variety of decorative products that come from the jeweller's bench. As many industries, specialization is growing. The initial 10 weeks of this course follows a general program on the jewellery industry after which the student selects an area of concentration from among Jewellery Making, Diamond Setting or Engraving. Depending upon the area of specialization, graduates find employment in jewellery design and manufacturing companies, the engraving industry, retail jewellery shops or local community craft centres. Graduates of this course are also able to begin a business of their own.

Length of Course .... 2 years
Entrance Requirements .... Grade 10

PROGRAM OF STUDY

FIRST YEAR

JWL	160	Introduction to Jewellery	4
ENG	130	Language and Communication	2
EC	130	Small Business Management	2
MET	160	Metallurgy	2
ELECTIVE		either JWL 161 (Jewellery Making) or JWL 162 (Diamond Making) or JWL 163 (Engraving)	10
		Total	20 cr. hr.

SECOND YEAR

JWL	260	Theory	4
MET	260	Metallurgy	2
SPECIALIZATION		either JWL 261 or JWL 262 or JWL 263 depending on First Year Option	15
		Total	21 cr. hr.

LATHE OPERATOR

This course is designed to prepare students for entry into industry as Lathe Operators. Persons who have completed Grade 12 and have an interest in the Machine Tool industry will find this course most suitable as preparation for initial employment as a Toolroom or Production Lathe Hand.

Length of Course .... one semester
Admission Requirements .... Grade 10

PROGRAM OF STUDY

MACH	137	Small Tools and Measurement	1
MACH	138	Lathe and Ancillary Equipment	5
DR	140	Blueprint Reading	1
MATH	137	Mathematics	2
		Total	9 cr. hr.

MACHINE SHOP PRACTICE

This course is designed to prepare students for entry into industry as machinists, apprentices, or machine operators. The category in which a student finds employment depends upon his age, previous experience, and the levels of skill and knowledge which he has acquired. Students find it advantageous to have completed Grade 12 in Machine Shop but, with suitable aptitudes and a willingness to work hard, those who have completed Grade 10 may prove successful in the course and later become good machinists.

Instruction is particularly concerned with measurement and machining to close tolerances, combined with production speeds and efficiencies of manufacture, sharpening cutting tools, and setting up machines.

Length of Course .... 1 year
Admission Requirements .... Grade 10

PROGRAM OF STUDY

MACH	140	Benchwork	2
MACH	141	Lathework	4
MACH	142	Milling and Shaping	3
MACH	143	Grinding	2
DR	130	Blueprint Reading	2
MET	132	Metallurgy	2
MATH	137	Mathematics	4
PHYS	140	Physics	2
ENG	141	English	3
		Total	23 cr. hr.

MARINE ENGINEERING

This course is designed to prepare young men for careers at sea as engineer officers or for shore positions of a similar nature. The course is organized with the co-operation of shipyards, shipowners, equipment manufacturers, and the Federal Department of Transport. During the four years of training, each student will receive formal instruction in school from highly qualified marine engineers and will gain practical experience in dockyards or in machine shops of shipyards, engine manufacturing, or marine equipment manufacturing companies. The Engineer Cadet will receive a remuneration of approximately $250.00 per month while training at shipyards or machine shops. While working in shipyards or machine shops, students will continue to be under the jurisdiction of the school and will be required to complete written assignments.

Successful graduates are guaranteed employment as Junior Engineer Officers on ships of the companies who sponsor this program. Field trips are arranged during the school period to familiarize cadets with procedures in machine shops and ships.

At the end of the four year course, students may write the examinations of the Federal Department of Transport for a Fourth Class Combined Certificate. The Third Class Certificate and part 'A' of the Second Class Certificate may be written after an additional period of twelve months at sea.

Four Year Program: (Six semesters plus 24 months of supervised experience.)
Admission Requirements .... **Grade 12**

Semester I

EN	103	Applied Heat	1
EN	105	Applied Mechanics	1
EN	109	Metallurgy	2
DR	113	Drafting	2
EL	121	Electricity	1
MS	124	Machine Shop	2
MAR	111	Ship Construction	1
MATH	103	Mathematics	1
CHEM	121	Chemistry	1
ENG	121	English	1
		Total	13 cr. hr.

Semester II

EN	110	Metallurgy	1
EN	101	Engineering Practice	2
EN	104	Applied Heat	1
EN	106	Applied Mechanics	1
EN	107	Strength of Materials	1
DR	114	Drafting	2
EL	122	Electricity	1
MS	125	Machine Shop	2
MATH	104	Mathematics	1
CHEM	122	Chemistry	1
		Total	13 cr. hr.

Semester III

EN	201	Engineering Practice	2
EN	203	Thermodynamics	2
EN	205	Applied Mechanics	1
EN	207	Strength of Materials	1
MAR	110	Ship's Business	1
DR	223	Drafting	1
EL	221	Electricity	1
MS	221	Machine Shop	2
MATH	203	Mathematics	1
		Total	12 cr. hr.

Semester IV

EN	202	Engineering Practice	2
EN	204	Thermodynamics	2
EN	206	Applied Mechanics	1
EN	210	Mechanics of Fluids	1
EN	208	Strength of Materials	1
DR	224	Drafting	1
EL	222	Electrotechnology	1
MS	222	Machine Shop	2
MATH	204	Mathematics	1
		Total	12 cr. hr.

Semester V

EN	301	Engineering Practice	2
EN	303	Thermodynamics	2
EN	305	Theory of Machines	2
EN	311	Naval Architecture	1
EN	313	Strength of Materials	1
EN	307	Mechanics of Fluids	1
EL	321	Electrotechnology	1
WELD	321	Welding	2
MATH	303	Mathematics	1
		Total	13 cr. hr.

Semester VI

EN	302	Engineering Practice	2
EN	304	Thermodynamics	2
EN	309	Strength of Materials	1
EN	306	Theory of Machines	2
EN	308	Mechanics of Fluids	2
EN	312	Naval Architecture	1
EL	322	Electrotechnology	1
MATH	304	Mathematics	1
		Total	12 cr. hr.

MARINE TUTORIAL COURSES

Courses are offered which prepare qualified seamen for Department of Transport Certificates of Competency in all grades, as Marine Engineers or as Mates and Masters of ships in the inland and minor waters of Canada, home trade waters and foreign-going service.

The minimum age specified by Department of Transport regulations for holders of Certificates of Competency is 20 years. A qualifying period of sea service of 3 years is also required.

Opportunities for advancement are good in the Marine field as modern and larger vessels are built for the Merchant service. A Canadian Coastguard is also being formed, with new vessels for government service.

COURSES OFFERED

For further information, please contact the registrar.

NAVIGATION: Seamanship, Ship Stability and Construction, Magnetism and Magnetic Compass, Chartwork — Electronic aids to navigation: Radar, gyro-compass, echo sounder, direction finder and Decca Navigator equipment.

MARINE ENGINEERING: Mathematics applicable to Engineering Problems, Boilers, Steam and Diesel Engines, Metals, Gases, Theory of Propulsion, Drafting, Combustion in Marine Engines, and Elementary Machine Shop Practice.

RADAR SIMULATOR: This is a realistic course in which navigation situations, involving up to five targets travelling on different courses at different speeds, can be made to appear on the radar screen. It is a practical course, wherein collision situations are set up and the student is given the opportunity of handling a vessel by simulation. Anti-collision exercises afford realistic training. This is a one week course.

RADAR OBSERVER: This course covers the principles of radar, adjustment of operational controls, practical starting and stopping equipment, interpretation of the display (including topography ashore as well as conspicuous objects afloat), factors affecting echo characteristics and false echoes, detection of movement plotting both relative and true, and working examples of plots containing fixed and moving targets with speed and course alterations. This course is combined with the Radar Simulator course. The duration is one month with three weeks devoted to Radar Observer or Theory and one week devoted to Radar Simulator or Practical.

A certificate of satisfactory attendance is given on completion of the Radar Simulator course. An endorsement is obtainable on examination by the Department of Transport after completion of the Radar Observer's course.

MECHANICAL SYSTEMS TECHNICIAN

This course is designed to prepare technicians for positions in the construction industry. Modern, well-equipped shops and labs provide practical experience to reinforce the theoretical studies. Graduates of this course are employed as mechanical equipment technicians, estimators, expeditors, building representatives and sales representatives.

Length of Course	2 years
Admission Requirements	Grade 12

PROGRAM OF STUDY

FIRST YEAR

MECL	100	Building Construction	2
MECL	101	Plumbing Installations	5
MECL	102	Steamfitting Installations	5
MECL	103	Principles of Refrigeration	3
MATH	100	Mathematics	4
ENG	100	Language and Communication	2
MECH	100	Mechanics	2
ELEC	100	Electrical Fundamentals	2
		Total	25 cr. hr.

SECOND YEAR

MECL	200	Building Construction	3
MECL	201	Plumbing Installations	3
MECL	202	Steamfitting Installations	3
MECL	203	Principles of Air Conditioning	4
MATH	200	Mathematics	4
ENG	200	Language and Communication	2
PHYS	100	Applied Physics	2
EC	100	Economics	2
ELTC	210	Electronic and Pneumatic Controls	2
		Total	25 cr. hr.

NAVIGATION OFFICER CADET

This course is organized with the co-operation of shipping companies and the Federal Department of Transport to prepare young men for careers at sea as deck officers. During the four years of training, students will receive formal instruction at the College from highly qualified mariners and will also gain practical experience aboard ships of the merchant fleet. The four-year period will be divided almost equally between school instruction and seagoing experience.

While undergoing their sea training, cadets will receive a nominal remuneration of approximately $250.00 per month and, in addition, will receive free board. The shipping companies who sponsor this program have guaranteed to employ successful graduates as junior navigating officers.

It should be noted that the Federal Department of Transport conducts examinations for, and issues Certificates of Competency in, the various deck officer grades. It may be possible for cadets to write the examination for a First Mate, Home Trade, Certificate of Competency, at the end of the four-year period of instruction. If sea service is approved, the examination for a Second Mate, Foreign-Going Certificate, may possibly be written at that time or it may be written after a further eight months of sea service.

Length of Course	4 years
Admission Requirement	Grade 12

NOTE: For this course all applications must be accompanied by a doctor's certificate attesting to a minimum vision of 20/30 and to normal colour perception.

PROGRAM OF STUDY

FIRST YEAR

MAR	100	Ship Knowledge	4
MAR	101	Magnetism and Magnetic Compass	3
MAR	102	Chart Projection	3
MAR	103	Rules of the Road	2
MAR	104	Communications	2
MATH	102	Mathematics	3
MAR	105	Meteorology	3
PHYS	102	Physics	2
ENG	101	English	2
EL	123	Electro Technology	2
		Total	26 cr. hr.

SECOND YEAR

MAR	200	Naval Architecture	3
ENG	207	English	2
MAR	201	Seamanship	4
MAR	202	Ship's Business	2
MATH	202	Mathematics	2
MAR	203	Navigation	4
PHYS	201	Physics	2
DR	100	Technical Drawing	2
ELTC	104	Electronics	3
		Total	24 cr. hr.

THIRD YEAR
(one semester: Jan.-April)

MAR	300	Naval Architecture	2
ELTC	204	Electronics	1
MAR	301	Seamanship	2
MATH	302	Mathematics	1
PHYS	310	Physics	1
CHEM	120	Chemistry	1
MAR	302	Tidal Theory	1
MAR	303	Navigation	2
MAR	304	Meteorology	1
MAR	305	Social Sciences	1
		Total	13 cr. hr.

FOURTH YEAR
(one semester: Jan.-March)

MAR	404	Chart Work	1
MAR	400	Naval Architecture	2
MAR	401	Seamanship	2
MATH	305	Mathematics	1
MAR	402	Tidal Theory	1
MAR	403	Navigation	2
ELTC	205	Electronics	1
ENG	401	English	1
MAR	405	Social Sciences	1
		Total	12 cr. hr.

OIL BURNER SERVICING

This course prepares the student to service completely many and varied types of oil burners. The student who successfully completes the course will be capable of performing complete annual overhauls and of providing efficient heating service during the heating season. He will be capable of adjusting burners so that they will operate with the highest possible combustion efficiency. He will have a general knowledge of the different types of heating systems including gravity warm air, gravity hot water, forced hot water, and steam. He will also have a basic knowledge of electricity and pipe fitting. During the course, the importance of "customer relations", good workmanship, and neatness is continually stressed. The great scarcity of skilled servicemen gives students every expectation of rewarding employment upon graduation. Those who have the necessary business acumen and drive may seek to establish their own dealerships within a relatively short period of time.

During the past years, hundreds of thousands of oil burners have been installed in Canada. This expansion has brought with it demands for qualified personnel to install and maintain this equipment. Training and technical education in trade schools are playing their part in developing this corps of servicemen.

Length of Course .... one semester
Admission Requirement .... Grade 10

HT	100	Domestic Oil Burners	2
HT	101	Domestic Oil Burners	3
EL	101	Electrical Fundamentals	1
PHYS	111	Physics	1
MATH	111	Mathematics	2
ENG	111	English	1
DR	130	Blue Print Reading	1
HT	141	Domestic Gas Burners elective*	1
		Total	11 or 12 cr. hr.

* HT 141 required to meet pre-requisite for II semester Heating Technician program.

PLASTICS

The plastics department offers several programs of study in the processing, fabricating, and finishing of plastic materials. Facilities include shops, labs, and advanced equipment used in research.

In Canada, the growth rate of the plastics industry is more than double the industrial average. Over 1,100 companies are engaged in plastics: more than 600 of these firms are in Ontario. This rapid expansion has created a strong demand for technicians at several levels.

PROGRAMS OF STUDY

There are three programs: Technician "A" certificate, Technician "B" certificate, and Operator's certificate.

Technician A is a two-year program requiring grade 12 with Physics, Chemistry, and some Drafting.

Technician B is a one-year program requiring grade 10 with some drafting.

Operator's Certificate is a one-semester program requiring grade 10 with some drafting.

PLASTICS TECHNICIAN A

TWO YEARS

FIRST YEAR

PL	100	Materials — Thermoplastic	3
PL	103	Materials — Thermoset	2
PL	110	Processes — Thermoplastic	3
PL	113	Processes — Thermoset	2
PL	120	Design — Thermoplastic	3
PL	123	Design — Thermoset	2
CHEM	110	Chemistry	3
PHYS	110	Physics	2
MATH	110	Mathematics	3
ENG	100	Language and Communication	3
EC	110	Industrial Management	1
		Total	27 cr. hr.

SECOND YEAR

PL	200	Materials — Thermoplastic	3
PL	203	Materials — Thermoset	2
PL	210	Processes — Thermoplastic	3
PL	213	Processes — Thermoset	2
PL	220	Design — Thermoplastic	3
PL	223	Design — Thermoset	2
CHEM	210	Chemistry	3
PHYS	210	Physics	2
MATH	210	Mathematics	2
English Elective		Language and Communication	2
EC	210	Industrial Management	1
		Total	25 cr. hr.

PLASTICS TECHNICIAN B

ONE YEAR

PL	100	Materials — Thermoplastic	3
PL	200	Materials — Thermoplastic	3
PL	110	Processes — Thermoplastic	3
PL	210	Processes — Thermoplastic	3
PL	120	Design — Thermoplastic	3
PL	220	Design — Thermoplastic	3
CHEM	110	Chemistry	3
PHYS	110	Physics	2
MATH	110	Mathematics	3
ENG	100	Language and Communication	3
EC	110	Industrial Management	1
		Total	30 cr. hr.

PLASTIC TECHNICIAN B: THERMOSET

ONE YEAR

PL	103	Materials — Thermoset	2
PL	113	Processes — Thermoset	2
PL	123	Design — Thermoset	2
PL	203	Materials — Thermoset	2
PL	213	Processes — Thermoset	2
PL	223	Design — Thermoset	2
CHEM	110	Chemistry	3
PHYS	110	Physics	2
MATH	110	Mathematics	3
ENG	100	Language and Communication	3
EC	101	Industrial Management	1
		Total	24 cr. hrs.

OPERATOR — THERMOPLASTIC I

ONE SEMESTER

PL	101	Materials — Thermoplastic	2
PL	111	Processes — Thermoplastic	2
PL	121	Design — Thermoplastic	2
CHEM	111	Chemistry	1
PHYS	111	Physics	1
MATH	111	Mathematics	1
ENG	111	Language and Communication	1
		Total	10 cr. hrs.

OPERATOR — THERMOPLASTIC II

ONE SEMESTER

PL	102	Materials — Thermoplastic	2
PL	112	Processes — Thermoplastic	2
PL	122	Design — Thermoplastic	2
CHEM	111	Chemistry	1
PHYS	111	Physics	1
MATH	111	Mathematics	1
ENG	111	Language and Communication	1
		Total	10 cr. hr.

OPERATOR — THERMOSET I

ONE SEMESTER

PL	103	Materials — Thermoset	2
PL	113	Processes — Thermoset	2
PL	123	Design — Thermoset	2
CHEM	111	Chemistry	1
PHYS	111	Physics	1
MATH	111	Mathematics	1
ENG	111	Language and Communication	1
		Total	10 cr. hr.

OPERATOR — THERMOSET II

ONE SEMESTER

PL	203	Materials — Thermoset	2
PL	213	Processes — Thermoset	2
PL	223	Design — Thermoset	2
CHEM	111	Chemistry	1
PHYS	111	Physics	1
MATH	111	Mathematics	1
ENG	111	Language and Communication	1
		Total	10 cr. hr.

REFRIGERATION (Pre-Apprenticeship)

This course is designed to prepare young men to enter an apprenticeship program leading to certification (compulsory in Ontario) as a journeyman refrigeration mechanic. This is an excellent opportunity for any young man who left school before completing grade 12 to enter a challenging trade that pays well and assures full-time employment. Under an agreement with the Industrial Training Branch of the Department of Labour, graduates of this course are granted equivalent time off the apprenticeship period and are excused the in-school requirements of the basic course (see Apprenticeship Section).

Length of Course .... **one semester**

The first semester will begin September 5, 1968. Prospective candidates for the second semester are advised to contact the Registrar's Office for exact starting date.

Admission Requirements .... **Grade 10**

PROGRAM OF STUDY

REF	130	Refrigeration Theory	4
REF	131	Refrigeration Practice	3
MATH	133	Mathematics	1
ENG	141	English	1
PHYS	133	Physics	1
DR	136	Drafting	1
WELD	140	Welding	1
		Total	12 cr. hr.

SIGNWRITING and SCREEN PROCESS PRINTING

Many large department stores, manufacturing companies, advertising agencies, and retail outlets maintain a staff of signwriters to produce new signs, posters and advertising displays. Although the competition in this vocation is vigorous there is ample opportunity for those who show creative ability and commercial effectiveness in their work. There are numerous shops in most large cities and towns where the need for well-qualified screen processors cannot be fulfilled. In addition, those who wish to start their own business will find many possibilities.

Length of Course .... **1 year**

Admission Requirements:

(a) Ontario Department of Education Statement of Standing awarded after successful completion of Grade 10 of any four-year program.

(b) A combination of education and experience considered equivalent by the Registrar.

PROGRAM OF STUDY

SIGN	130	Basic Signwriting and Screen Process	9
SIGN	131	Signwriting or Sign 132 Screen Process	10
MATH	134	Mathematics	3
ENG	130	Language and Communication	2
		Total	24 cr. hr.

SURVEY TECHNICIAN

The Survey Technician course provides the basic theoretical and practical knowledge required for those who wish to enter surveying at the technician level. Skill is attained by intensive field work in surveying with modern equipment. Survey problems are worked out under field conditions and computed and recorded in the drafting room.

Survey technicians are employed by government offices, engineering firms, and construction companies.

Length of Course .... 2 years
Admission Requirements .... Grade 12

PROGRAM OF STUDY

FIRST YEAR

SURV	100	Survey Computations and Drafting	5
SURV	101	Plane Surveying	6
CIV	100	Construction Materials and Methods	3
DR	121	Descriptive Geometry	1
MATH	100	Mathematics	4
ENG	100	Language and Communication	2
PHYS	100	Applied Physics	3
		Total	24 cr. hr.

SECOND YEAR

SURV	200	Survey Computations and Drafting	3
SURV	201	Advanced Plane Surveying	4
CIV	202	Municipal Services	2
SURV	202	Photogrammetry	1
SURV	203	Spherical Trigonometry and Astronomy	2
SURV	204	Legal Surveying	3
MATH	200	Mathematics	4
ENG	200	Language and Communication	2
EC	100	Economics	2
MECH	100	Mechanics	2
		Total	25 cr. hr.

TEACHING TECHNIQUES

The increasing pace of technological advancement in industry and commerce is changing our traditional concepts of education. No longer is it possible to view education as a preparation for life; it is in fact a continuous lifelong process of adaptation and change to suit the needs of the individual in a rapidly-changing environment. More and more adults find themselves in the formal classrooms of traditional educational institutions learning new bodies of knowledge or new techniques while others manage to make the adjustments demanded of them by an exercise of their own ingenuity and self-directed learning. Between these two positions is a large volume demand for training on the job. Industrial and commercial enterprises are increasingly faced with the necessity of training and retraining their employees. To accomplish this many people in factories and offices find that their full-time occupation is that of an instructor as they adapt people to new skills and techniques or prepare them to take supervisory positions. Although there is a great demand for skilled manpower at present, a greater problem over the next ten or twenty years will be the preparation of people for promotion.

This course has been designed to help instructors improve their teaching skill, to acquaint them with a greater variety of techniques and to broaden their understanding of the teaching-learning process as it concerns adult education. This is essentially a practical course concerned with practices and techniques. It introduces only as much pedagogical theory as is essential to a rudimentary understanding of the processes involved.

Length of Course .... Three weeks
Admission Requirements .... Anyone who is employed as an instructor or who may expect to be so employed.

PROGRAM OF STUDY

ED	160	Teaching Techniques	3 cr. hr.

TOOL DESIGN TECHNICIAN

The highly-competitive conditions under which modern industry operates necessitates economy of operation, quality products and quantity production. These essentials cannot be achieved or maintained without the widespread application of production tooling to manufacturing. It is the function of the Tool and Die Designer to design such tooling. He plays a vital role in the production process.

In industry, the Tool and Die Design Technician may be employed as a designer or as an estimator or he may assist the Production or Tool Engineer to solve tooling problems involved in manufacturing a product. He must be skilled in drafting techniques but he must also be familiar with manufacturing processes and be competent to judge the merits of different methods. A sound knowledge of manufacturing specifications, quality control, materials, tool performance, and manufacturing costs is also essential if he is to function effectively in a production unit.

The aim of the Tool and Die Design Technician Course is to equip the student with the skills involved in these areas. During the course, every effort is made to develop in the student the qualities of imagination, ingenuity and flexibility which are essential if he is to meet the challenge of new products, new techniques and new materials.

Tool Design offers an interesting, demanding and remunerative career with prospects of advancement to executive and managerial positions in industry.

Length of Course .... 2 years
Admission Requirements .... Grade 12
Either Machine Shop or Drafting Option.

PROGRAM OF STUDY

FIRST YEAR

TD	100	Machining Jigs	3
TD	101	Machining Fixtures	3
TD	102	Assembly Jigs and Fixtures and Welding Fixtures	1
TD	103	Tool Layouts — Cutting Tool and Gauge Design	1
MACH	120	Benchwork	1
MACH	121	Lathework	3
MACH	122	Milling and Shaping	2
MACH	123	Grinding	1
MATH	101	Mathematics	4
MECH	101	Mechanics	2
ENG	101	English	2
MET	101	Metallurgy or METR 100 (Metrology) Option	2
PHYS	101	Suggested Physics Elective	2
		Total	25 cr. hr.

SECOND YEAR

TD	200	Die Design (Cutting sheet metal)	4
TD	201	Die Design (Bending and Forming Sheet Metal)	3
TD	202	Die Design (Drawing Sheet Metal)	3
TD	203	Die Design (Plastic Mould and Impact Extrusion)	2
TD	204	Process Engineering	1
ENG	131-134	English Electives	2
MATH	201	Mathematics	4
MECH	201	Mechanics of Materials	2
MET	101	(Metallurgy) or METR 100 (Metrology) Option	2
		Total	23 cr. hr.

Electives

EL	105	Electrical Fundamentals	2
CHEM	101	Chemistry	2
EC	200 or EC 300	Economics	2

TOOLMAKING TECHNICIAN

The toolmaker plays a vital role in the manufacturing process, helping to produce jigs, fixtures, dies, tools and gauges which are essential to modern production methods. Toolmaking Technician I is the first year of a two-year course whose aims are to prepare students for this role, providing the practical training and theoretical knowledge which will enable graduates to find employment in the tool and die field. After suitable work experience, a graduate may expect to be employed in the engineering office or advance to a supervisory position in the toolroom. In addition to instruction in the operation of standard machines such as the lathe, milling machine, shaper and grinder, the latest machining techniques and manufacturing processes are studied. Accuracy in machining and measurement are stressed. Lectures on Machine Shop and Toolroom Theory provide essential trade information.

The successful graduate of Toolmaking Technician I and II may, after two years of industrial experience, apply to the Ontario Association of Certified Engineering Technicians and Technologists for certification as an Engineering Technician.

Length of Course .... 2 years
Admission Requirements .... Grade 12
Machine Shop Option

PROGRAM OF STUDY

FIRST YEAR

TD	100	Machining Jigs	3
TD	101	Machining Fixtures	3
TD	102	Assembly Jigs and Fixtures and Welding Fixtures	1
TD	103	Tool Layouts — Cutting Tool and Gauge Design	1
MACH	120	Benchwork	1
MACH	121	Lathework	3
MACH	122	Milling and Shaping	2
MACH	123	Grinding	1
MATH	101	Mathematics	4
MECH	101	Mechanics	2
ENG	101	English	2

MET	101	Metallurgy or METR 100 Metrology Option	2
		Total	25 cr. hr.
PHYS	101	Suggested Physics Elective	2

SECOND YEAR

MACH	202	Machining Jigs	3
MACH	203	Machining Fixtures	3
MACH	204	Assembly Jigs and Fixtures and Welding Fixtures	1
MACH	205	Tool Layouts — Cutting Tool and Gauge Design	1
MACH	206	Benchwork	1
ENG	131-134	English Electives	3
MATH	201	Mathematics	2
MECH	201	Mechanics of Materials	1
MET	101	Metallurgy or METR 100 (Metrology) Option	4
		Total	19 cr. hr.

Electives

EL	105	Electrical Fundamentals	2
CHEM	101	Chemistry	2
EC	200 or EC 300	Economics	2

WATCHMAKING

This course is designed to prepare young men for employment in a jewellery store as a watch repairer. In the Province of Ontario, where this trade is certified, the students usually enter a 4-year apprenticeship. Under an agreement with the Industrial Training Branch of the Department of Labour, graduates of this course are excused two years of the apprenticeship term. Graduates of an optional third year of advanced studies are excused the entire apprenticeship term. For the past several years a shortage of competent watchmakers has been noted throughout Canada and the United States and the employment opportunities for our graduates are excellent. Competent watchmakers are also in demand in precision industries and in space research industries. The watchmaking trade offers many opportunities for those who are aiming at self-employment.

Length of Course	2 or 3 years
Admission Requirements	Grade 10

PROGRAM OF STUDY

FIRST YEAR

WACH	130	Theory of Watchmaking	6
WACH	131	Watchmaking Skills	13
EC	130	Small Business Management	2
ENG	130	Language and Communication	2
MET	130	Metallurgy I	2
		Total	25 cr. hr.

SECOND YEAR

WACH	230	Theory of Watchmaking	6
WACH	231	Watchmaking Skills	13
MET	131	Metallurgy II	2
MATH	130	Mathematics	3
		Total	24 cr. hr.

THIRD YEAR

WACH	330	Theory of Watchmaking	6
WACH	331	Watchmaking Skills	13
ENG	211	Language and Communication	2
EC	100	Economics	2
		Total	23 cr. hr.

WELDING and FABRICATING

Modern welding processes are continuing to revolutionize the metal fabricating industries and will effect even greater changes as new processes are developed. Welding is an integral part of a great many trades and remains the most economical method of joining metals. Graduates of this course are well prepared to advance beyond the operator level to positions of responsibility; welding supervision, welding inspection, sales and manufacturer's representatives, are but a few. Students graduating from this course will be considered for the welding specialist program, which is designed to prepare graduates to proceed toward positions in the welding industry at the technician level.

Length of Course	1 year
Entrance Requirement	Grade 10

PROGRAM OF STUDY

WELD	130	Oxy-Acetylene Welding, Brazing, and Cutting	2
WELD	131	Electric Arc Welding	5
WELD	132	Welding Metallurgy	2
WELD	133	Inert Gas Welding	2
WELD	134	Pipe Welding	1
WELD	135	Fabrication	3
MATH	136	Mathematics	2
ENG	130	Language	2
DR	134	Pattern Layout	2
DR	135	Drafting	2
		Total	23 cr. hr.

APPRENTICE PROGRAMS

The courses outlined in this section of the calendar are offered in co-operation with the Industrial Training Branch of the Department of Labour under the provisions of the Apprenticeship and Tradesmen's Qualification Act, 1964. Every eligible person above the age of sixteen years, employed in a capacity other than a journeyman in a designated trade must be registered and under contract with the Industrial Training Branch of the Department of Labour. Under the terms of the Act, apprenticeship contracts are written in terms of periods of hours rather than calendar periods as was the case prior to 1964.

In addition to on-the-job training, all registered apprentices are required to attend regular day classes consisting of trade theory and practice, and academic subjects relating to their trade at a College of Applied Arts and Technology.

The in-school period normally consists of three courses. The initial (basic) course of 7 to 8 weeks duration is usually conducted during the first or second period of the apprenticeship contract. A second (intermediate) course of 7 or 8 weeks duration would follow and be held during the second or third period of the contract. The third (advanced) course is also 7 or 8 weeks but it would be conducted in the latter period of the apprenticeship contract. In the trades of Baker and Chef, these apprentices attend a 15-week basic course in their initial period of apprenticeship followed by a 15-week advanced course prior to their completing the final apprenticeship period. Apprentices in the trades of Barber and Hairdresser attend one 18-week course only. Retail Meat Cutter apprentices are only required to complete a 15-week course.

These courses are arranged by the Department of Labour under a Federal-Provincial training agreement and are free of charge to registered apprentices. To cover the cost of room and board, living allowances are paid by the Federal Department of Manpower and Immigration or the Ontario Department of Labour while the apprentice is attending school. For out-of-town apprentices the cost of transportation is provided to and from the training centre at the beginning and end of each course.

In certain of the trades requiring compulsory certification of qualifications, persons in possession of the Secondary School Graduation Diploma granted upon completion of Grade 12 of either the Science Technology and Trades Branch or the Arts and Science Branch are granted credit for a specific number of hours from each period of the apprenticeship term. In addition to the preceding, persons in possession of a Grade 12 diploma endorsed in a subject area corresponding to the apprenticeship program to be pursued will be excused from taking the basic course of in-school training. Where credit is applicable it is so stated under the course outline of the trade so affected.

It is important to note that these courses are available to **REGISTERED APPRENTICES ONLY.** Prospective apprentices may obtain further information by writing to:

Mr. W. F. Davy,
Director, Industrial Training Branch,
Ontario Department of Labour.
74 Victoria Street,
Toronto, Ontario.

The following apprenticeship courses are offered at this Institute:

- Baking
- Barbering
- Carpentry
- Chef Training
- Electrical Construction
- Hairdressing
- Iron Worker
- Lathing
- Masonry
- Millwright
- Painting and Decorating
- Plastering
- Plumbing
- Refrigeration and Air Conditioning
- Retail Meat Cutters
- Sheet Metal Mechanic
- Steamfitting
- Structural Steel Drafting
- Watchmaking (See page 38)

Note: As it is necessary to prepare the materials for this Calendar well in advance of the beginning of each school year, revisions to the length of the apprenticeship term and the length of the in-school training period cannot be anticipated.

BAKING

Length of apprenticeship term:

Two periods of 2,000 hours each.

Length of in-school training program:

Basic Course: 15 weeks—conducted at the beginning of the apprenticeship term.
Advanced Course: 15 weeks—conducted prior to completion of the apprenticeship term.

Stafford Foods Award

Trophy of excellence plus a bursary award — $25.00.
Awarded annually by Stafford Foods Ltd. to the top all-round student graduating from the advanced courses.

PROGRAM OF STUDY

FIRST YEAR

BAK	10	Baking I	11
MATH	50	Mathematics	2
ENG	11	English	2
		Total	15 cr. hr.

SECOND YEAR

BAK	20	Baking II	11
MATH	60	Mathematics	2
ENG	21	English	2
		Total	15 cr. hr.

BARBERING

Length of apprenticeship term:

Three periods of 1,800 hours each.

Length of in-school training program:

18 weeks — conducted at the beginning of the apprenticeship term.

PROGRAM OF STUDY

BAR	10	Theory	5
BAR	11	Practice	16
EC	10	Small Business Management	2
ENG	11	English	2
		Total	25 cr. hr.

CARPENTRY

Length of apprenticeship term:

Four periods of 1,800 hours.

Length of in-school training program:

Basic Course: 8 weeks — conducted during the first apprenticeship period.
Intermediate Course: 7 weeks — conducted during the second apprenticeship period.
Advanced Course: 7 weeks — conducted during the third apprenticeship period.

PROGRAM OF STUDY

FIRST YEAR

CAR	10	Carpentry I	6½
MATH	12	Mathematics	½
ENG	10	English	½
DR	10	Blue Print Reading and Drafting	½
		Total	8 cr. hr.

SECOND YEAR

CAR	20	Carpentry II	6½
MATH	22	Mathematics	½
ENG	20	English	½
DR	21	Blue Print Reading and Drafting	½
		Total	8 cr. hr.

THIRD YEAR

CAR	30	Carpentry III	6½
MATH	32	Mathematics	½
ENG	30	English	½
DR	32	Blue Print Reading and Drafting	½
		Total	8 cr. hr.

CHEF TRAINING

Length of in-school training program:

Three periods of 2,000 hours.

Length of in-school training program:

Basic Course: 15 weeks—conducted at the beginning of the apprenticeship term.
Advanced Course: 15 weeks—conducted prior to completion of the apprenticeship term.

The Florence Montgomery Bursary Award — $100.00.

Awarded annually by the Toronto and District Branch of the Canadian Restaurant Association to the top all-round student graduating from the advanced courses.

PROGRAM OF STUDY

FIRST YEAR

CHEF	10	Chef Training I	11
MATH	50	Mathematics	2
ENG	11	English	2
		Total	15 cr. hr.

SECOND YEAR

CHEF	20	Chef Training II	11
MATH	60	Mathematics	2
ENG	21	English	2
		Total	15 cr. hr.

ELECTRICAL CONSTRUCTION

Length of apprenticeship term:

Five periods of 1,800 hours.

Grade 12 credit: (see page 40)

200 hours in each period.

Length of in-school training program:

Basic Course: 8 weeks — conducted during the first or second apprenticeship period.

Intermediate Course: 7 weeks — 2nd or 3rd period.

Advanced Course: 7 weeks — conducted during fourth apprenticeship period.

Industrial Electronics: 7 weeks — conducted during fifth apprenticeship period. All apprentices graduating from the advanced course have the opportunity of taking this course on a voluntary basis.

PROGRAM OF STUDY

FIRST YEAR

EL	10	Electrical Construction I	6½
MATH	14	Mathematics	½
ENG	10	English	½
DR	10	Drafting	½
		Total	8 cr. hr.

SECOND YEAR

EL	20	Electrical Construction II	6½
MATH	24	Mathematics	½
ENG	20	English	½
DR	22	Drafting	½
		Total	8 cr. hr.

THIRD YEAR

EL	30	Electrical Construction III	6½
MATH	34	Mathematics	½
ENG	30	English	½
DR	32	Drafting	½
		Total	8 cr. hr.

FOURTH YEAR (ELECTIVE)

EL	40	Industrial Electronics Controls	6
WELD	11	Welding	2
		Total	8 cr. hr.

HAIRDRESSING

Length of apprenticeship term:

Three periods of 1,500 hours each.

Length of in-school training program:

18 weeks — conducted at the beginning of the apprenticeship term.

PROGRAM OF STUDY

HAIR	10	Theory of Hairdressing	6
HAIR	11	Hairdressing Practice	6
EC	10	Small Business Management	2
ENG	11	English	2
SC	10	Applied Science	2
		Total	18 cr. hr.

IRONWORKER

Grade 10 required.

Length of apprenticeship term:

Three periods of 2,000 hours.

Length of in-school training program:

Basic Course: 8 weeks — conducted during the first apprenticeship term.

Intermediate Course: 8 weeks — conducted during the second apprenticeship term.

Advanced Course: 8 weeks — conducted during the third apprenticeship period.

PROGRAM OF STUDY

FIRST YEAR

IRON	10	Ironwork I	5
MATH	10	Mathematics	½
ENG	10	English	½
PHYS	11	Applied Physics	½
DR	14	Drafting	½
WELD	10	Welding	½
WELD	11	Welding	½
		Total	8 cr. hr.

SECOND YEAR

IRON	20	Ironwork II	5
MATH	20	Mathematics	½
ENG	20	English	½
PHYS	21	Applied Physics	½
DR	24	Drafting	1
WELD	20	Welding	½
WELD	21	Welding	½
		Total	8½ cr. hr.

THIRD YEAR

IRON	30	Ironwork III	5
MATH	30	Mathematics	½
ENG	30	English	½
PHYS	31	Applied Physics	½
DR	34	Drafting	1
WELD	30	Welding	½
WELD	31	Welding	½
		Total	8½ cr. hr.

LATHING

Length of apprenticeship term:

Three periods of 1,800 hours.

Length of in-school training program:

Basic: 8 weeks — conducted during the first year of apprenticeship.
Intermediate: 7 weeks — conducted during the second year of apprenticeship.
Advanced: 7 weeks — conducted during the third year of apprenticeship.

PROGRAM OF STUDY

FIRST YEAR

LATH	10	Lathing I	6
MATH	11	Mathematics	½
ENG	11	English	½
DR	10	Drafting	½
WELD	10	Welding	½
		Total	8 cr. hr.

SECOND YEAR

LATH	20	Lathing II	6
MATH	21	Mathematics	½
ENG	21	English	½
DR	26	Drafting	½
WELD	21	Welding	½
		Total	8 cr. hr.

THIRD YEAR

LATH	30	Lathing III	6
MATH	31	Mathematics	½
ENG	31	English	½
DR	36	Drafting	½
WELD	31	Welding	½
		Total	8 cr. hr.

MASONRY

Length of apprenticeship term:

Four periods of 1,600 hours.

Length of in-school training program:

Basic Course: 8 weeks — conducted during the first or second apprenticeship period.
Intermediate Course: 7 weeks — conducted during the second apprenticeship period.
Advanced Course: 7 weeks — conducted during the third apprenticeship period.

PROGRAM OF STUDY

FIRST YEAR

MAS	10	Masonry I	6½
MATH	11	Mathematics	½
ENG	11	English	½
DR	10	Blue Print Reading and Drafting	½
			8 cr. hr.

SECOND YEAR

MAS	20	Masonry II	6½
MATH	21	Mathematics	½
ENG	21	English	½
DR	20	Blue Print Reading and Drafting	½
			8 cr. hr.

THIRD YEAR

MAS	30	Masonry III	6½
MATH	31	Mathematics	½
ENG	31	English	½
DR	30	Blue Print Reading and Drafting	½
			8 cr. hr.

MILLWRIGHT

Length of apprenticeship term:

Four periods of 2,000 hours.

Length of in-school training program:

Basic Course: 8 weeks — conducted during the first or second apprenticeship period.
Intermediate Course: 7 weeks — conducted during the second and third apprenticeship period.
Advanced Course: 7 weeks — conducted during the third and fourth apprenticeship period.

PROGRAM OF STUDY

FIRST YEAR

MILL	10	Millwright I	5
MATH	15	Mathematics	½
ENG	10	English	½
PHYS	14	Applied Physics	½
DR	14	Drafting	½
WELD	10	Welding	½
WELD	11	Welding	½
			8 cr. hr.

SECOND YEAR

MILL	20	Millwright II	5
MATH	25	Mathematics	½
ENG	21	English	½
PHYS	21	Applied Physics	½
DR	24	Drafting	½
WELD	20	Welding	½
WELD	21	Welding	½
			8 cr. hr.

THIRD YEAR

MILL	30	Millwright III	5
MATH	31	Mathematics	½
ENG	31	English	½
PHYS	31	Applied Physics	½
DR	34	Drafting	½
WELD	30	Welding	½
WELD	31	Welding	½
			8 cr. hr.

PAINTING and DECORATING

Length of apprenticeship term:

Four periods of 1,800 hours.

Length of in-school training program:

Basic Course: 8 weeks — conducted during the first apprenticeship period.
Intermediate Course: 7 weeks — conducted during the second apprenticeship period.
Advanced Course: 7 weeks — conducted during the third apprenticeship period.

PROGRAM OF STUDY

FIRST YEAR

PAINT	10	Painting and Decorating I	6½
MATH	11	Mathematics	½
ENG	10	English	½
DR	10	Drafting	½
			8 cr. hr.

SECOND YEAR

PAINT	20	Painting and Decorating II	6½
MATH	21	Mathematics	½
ENG	21	English	½
DR	20	Drafting	½
			8 cr. hr.

THIRD YEAR

PAINT	30	Painting and Decorating III	6½
MATH	31	Mathematics	½
ENG	31	English	½
DR	35	Drafting	½
			8 cr. hr.

PLASTERING

Length of apprenticeship term:

Four periods of 1,600 hours.

Length of in-school training program:

Basic: 8 weeks — conducted during the first apprenticeship term.
Intermediate: 7 weeks — conducted during the second apprenticeship term.
Advanced: 7 weeks — conducted during the third apprenticeship term.

PROGRAM OF STUDY

FIRST YEAR

PLAS	10	Plastering I	6½
MATH	11	Mathematics	½
ENG	11	English	½
DR	10	Drafting	½
			8 cr. hr.

SECOND YEAR

PLAS	20	Plastering II	6½
MATH	21	Mathematics	½
ENG	21	English	½
DR	20	Drafting	½
			8 cr. hr.

THIRD YEAR

PLAS	30	Plastering III	6½
MATH	31	Mathematics	½
ENG	31	English	½
DR	36	Drafting	½
			8 cr. hr.

PLUMBING

Length of apprenticeship course:

Five periods of 1,800 hours.

Grade 12 credit (see page 40)

Length of in-school training program:

Basic Course: 8 weeks — conducted during the first and second apprenticeship period.
Intermediate Course: 7 weeks — conducted during the third apprenticeship period.
Advanced Course: 7 weeks — conducted prior to completion of apprenticeship.

PROGRAM OF STUDY

FIRST YEAR

PLUM	10	Plumbing I	5½
MATH	16	Mathematics	½
ENG	10	English	½
PHYS	12	Applied Physics	½
DR	10	Drafting	½
WELD	10	Welding	½
			8 cr. hr.

SECOND YEAR

PLUM	20	Plumbing II	5½
MATH	26	Mathematics	½
ENG	20	English	½
PHYS	22	Applied Physics	½
DR	20	Drafting	½
WELD	20	Welding	½
			8 cr. hr.

THIRD YEAR

PLUM	30	Plumbing III	5½
MATH	36	Mathematics	½
ENG	30	English	½
PHYS	32	Applied Physics	½
DR	37	Drafting	½
WELD	30	Welding	½
			8 cr. hr.

REFRIGERATION and AIR CONDITIONING

Length of apprenticeship term:
Five periods of 1,800 hours.

Length of in-school training program:

Basic Course: 8 weeks — conducted during the first or second apprenticeship period.

Intermediate Course: 7 weeks — conducted during the second and third apprenticeship period.

Advanced Course: 7 weeks — conducted prior to completion of the apprenticeship period.

PROGRAM OF STUDY

FIRST YEAR

REF	10	Refrigeration and Air Conditioning I	5½
MATH	19	Mathematics	½
ENG	10	Language and Communication	½
PHYS	15	Applied Physics	½
DR	18	Drafting	½
WELD	10	Welding	½
			8 cr. hr.

SECOND YEAR

REF	20	Refrigeration and Air Conditioning II	5½
MATH	29	Mathematics	½
ENG	20	Language and Communication	½
PHYS	25	Applied Physics	½
DR	28	Drafting	½
WELD	20	Welding	½
			8 cr. hr.

THIRD YEAR

REF	30	Refrigeration and Air Conditioning III	5½
MATH	39	Mathematics	½
ENG	30	Language and Communication	½
PHYS	35	Applied Physics	½
DR	38	Drafting	½
WELD	30	Welding	½
			8 cr. hr.

SHEET METAL MECHANIC

Length of apprenticeship term:
Five periods of 1,800 hours.

Grade 12 credit (see page 40)
200 hours in each period.

Length of in-school training program:

Basic: 7 weeks — conducted during the third apprenticeship period.

Intermediate: 7 weeks — conducted during the third apprenticeship period.

Advanced: 7 weeks — conducted prior to the completion of apprenticeship.

PROGRAM OF STUDY

FIRST YEAR

SHM	10	Sheet Metal Mechanic I	5½
MATH	17	Mathematics	½
ENG	10	Language and Communication	½
PHYS	13	Applied Physics	½
DR	10	Drafting	½
WELD	10	Welding	½
			8 cr. hr.

SECOND YEAR

SHM	20	Sheet Metal Mechanic II	5½
MATH	27	Mathematics	½
ENG	20	Language and Communication	½
PHYS	23	Applied Physics	½
DR	20	Drafting	½
WELD	20	Welding	½
			8 cr. hr.

THIRD YEAR

SHM	30	Sheet Metal Mechanic III	5½
MATH	37	Mathematics	½
ENG	30	Language and Communication	½
PHYS	33	Applied Physics	½
DR	39	Drafting	½
WELD	11	Welding	½
			8 cr. hr.

STEAMFITTING

Length of apprenticeship term:

Five periods of 1,800 hours.
Grade 12 credit (see page 40)
450 hours in each period.

Length of in-school training program:

Basic Course: 7 weeks — conducted during the first and second apprenticeship period.
Intermediate Course: 7 weeks — conducted during the third apprenticeship period.
Advanced Course: 7 weeks — conducted prior to the completion of apprenticeship.

PROGRAM OF STUDY

FIRST YEAR

STEA	10	Steamfitting I	5
MATH	16	Mathematics	½
ENG	10	English	½
PHYS	14	Applied Physics	½
DR	10	Blueprint Reading and Drafting	½
WELD	10	Welding	½
WELD	11	Welding	½
			8 cr. hr.

SECOND YEAR

STEA	20	Steamfitting II	5
MATH	26	Mathematics	½
ENG	20	English	½
PHYS	24	Applied Physics	½
DR	20	Blueprint Reading and Drafting	½
WELD	20	Welding	½
WELD	21	Welding	½
			8 cr. hr.

THIRD YEAR

STEA	30	Steamfitting III	5
MATH	36	Mathematics	½
ENG	30	English	½
PHYS	34	Applied Physics	½
DR	33	Blueprint Reading and Drafting	½
WELD	30	Welding	½
WELD	31	Welding	½
			8 cr. hr.

STRUCTURAL STEEL DRAFTING

Length of apprenticeship term:

Three periods of 2,000 hours.

Length of in-school training program:

Basic Course: 8 weeks — conducted during the first or second apprenticeship period.
Intermediate Course: 7 weeks — conducted during the second or third apprenticeship period.
Advanced Course: 7 weeks — conducted prior to completion of apprenticeship term.

PROGRAM OF STUDY

FIRST YEAR

STR	10	Structural Steel Drafting I	7
MATH	18	Mathematics	½
ENG	10	English	½
			8 cr. hr.

SECOND YEAR

STR	20	Structural Steel Drafting II	7
MATH	28	Mathematics	½
ENG	20	English	½
			8 cr. hr.

THIRD YEAR

STR	30	Structural Steel Drafting III	7
MATH	38	Mathematics	½
ENG	30	English	½
			8 cr. hr.

WELDING OPERATOR

This course provides an excellent opportunity for any man between 16 and 50 to learn a useful skill in a relatively short period of time and to enter a well paying trade at a mechanic's level. Because general welding is an integral part of a great many trades, graduates of this course experience little difficulty finding suitable employment. Evening courses in special welding techniques are readily available for the ambitious person wishing to prepare for advancement.

Length of Course .... one semester

The first term course will begin on September 5, 1968. Prospective candidates for the second semester are advised to contact the Registrar's Office for the exact starting date.

Admission Requirements .... Grade 8 minimum

The grade 10 prerequisite is waived for this course. Prospective candidates should have a minimum of grade 8 education, be ambitious, and be in good physical condition. Aptitude tests are available for applicants who need advice on their ability to succeed in the course.

PROGRAM OF STUDY

WELD	140	Oxy-Acetylene Welding, Brazing and Cutting	2
WELD	141	Electric Arc Welding	8
WELD	142	Welding Theory	1
DR	140	Blueprint Reading	1
		Total	12 cr. hr.

WELDING SPECIALIST

This course is designed to prepare welding specialists with the skills and knowledge required to handle advanced welding assignments involving new materials, processes, and techniques. The facilities include modern shops and equipment, and a comprehensive range of supplies and materials. Graduates are qualified to handle the specialized welding required by code specifications and could also find opportunities as inspectors and designers.

Length of Course .... 1 year

Admission Requirements .... Grade 12 with welding specialization, or Grade 12 with completion of a Welding and Fabricating Program at a College of Applied Arts and Technology.

PROGRAM OF STUDY

WELD	100	Theory	5
WELD	101	Practice	4
ENG	100	Language and Communication	2
MATH	100	Mathematics	4
MET	100	Metallurgy	2
EL	100	Electrical Fundamentals	2
MECH	110	Mechanics of Materials	2
DR	100	Technical Drawing	2
DR	120	Descriptive Geometry	1
		Total	24 cr. hr.

Details of Courses

ABBREVIATIONS

AIR	Air Conditioning
AP	Appliance Servicing
ARCH	Architecture
BAK	Baking
BAR	Barbering
BM	Business Machines
CAR	Carpentry
CHEF	Chef
CHEM	Chemistry
CHI	Child Care
CIV	Civil Engineering
CO	Construction
DENT	Dental
DR	Drafting
EC	Economics
ED	Education
EL	Electrical
ELTC	Electronics
EN	Engineering
ENG	English
FOOD	Food Service
HAIR	Hairdressing
HT	Heating
IND	Industrial Processes
INST	Instrumentation
IRON	Ironworker
JWL	Jewellery
LATH	Lathing
MACH	Machine Shop
MAR	Marine
MAS	Masonry
MATH	Mathematics
MECL	Mechanical
MECH	Mechanics
MET	Metallurgy
METR	Metrology
MILL	Millwright
PAINT	Painting and Decorating
P.E.	Physical Education
PHYS	Physics
PL	Plastics
PLAS	Plastering
PLUM	Plumbing
PSY	Psychology
REF	Refrigeration

The number of a course indicates the year and division of the program as follows:

10 - 19	First Year Apprentice
20 - 29	Second Year Apprentice
30 - 39	Third Year Apprentice
100 - 129	First Year Technician
130 - 159	First Year Technical
160 - 199	First Year Applied Arts
200 - 229	Second Year Technician
230 - 259	Second Year Technical
260 - 299	Second Year Applied Arts
300 - 399	as above
400 - 499	as above

AIR CONDITIONING

AIR 100 PRINCIPLES OF REFRIGERATION (5)

Change of state, B.T.U., vapour pressure, heat transfer, absolute pressure, Boyle's and Charles' laws, absolute temperature, perfect gas equation, gas constants, Avogadro's law, Dalton's law, derivation of specific humidity. Heat content, partial pressure and general gas law problems related to refrigeration, refrigeration cycle, refrigerants, compressors, valve types, seals, lubrication, air and water cooled condensers, evaporative condensers, water regulating valves, matering devices with automatic and thermostatic valve operation in detail, types of evaporators, auxiliary equipment — oil separators, heat exchangers, overloads, overcurrent devices and reduced voltage starters, field trips.

AIR 101 PSYCHROMETRICS AND LOAD ESTIMATING (3)

Specific humidity, vapour pressure, relative humidity, dry bulb, wet bulb cause and effect, enthalpy of air-water mixture, dew point, relation among dry bulb, wet bulb, dew point, relative humidity and enthalpy, concept of adiabatic saturation, appartus dew point, sensible heat factor, solutions of practical air conditioning problems, body comfort, orientation of building, construction materials, design conditions, solar loads, storage effect, structure, weight and daily range calculations, air films and air spaces, transmission co-efficients, ventilation and infiltration, internal loads.

AIR 102 REFRIGERATION LAB (3)

Safety rules, operation and care of refrigeration hand tools, tubing tools, soldering and silver brazing, leak detectors, gauges and thermometers, refrigeration compressors, study of construction, dismantling and repair operations, testing, refrigerant flow controls (evaporator feed), installation of single and multiplex evaporator systems, test instruments — resistance and thermistor temperature bridges, types of psychrometers, dew point indicators and relative humidity indicators, ohmmeters, wheatstone bridges and meggers.

AIR 200 REFRIGERATION AND AIR CONDITIONING LAB (2)

Packaged equipment control and trouble shooting, centrifugal chillers, electronic and pneumatic controls, use of air conditioning instruments, velometer, anemotherm dryer electric control panels, cooling and dehumidifying, pneumatic control panel heating and humidifying, motor control equipment.

AIR 201 CONTROL SYSTEMS (6)

Set point, control point, deviation, differential throttling range, lag, timed two-position control, proportional control, basic wheatstone bridge, voltage amplification phase shift, summer-winter compensation, pneumatic actuators, valves, sensors, day-night set back, solenoids, maximum and minimum pressures, switching relays, pressure-electric switches, master-submaster control.

AIR 202 DESIGN OF AIR CONDITIONING SYSTEMS (3)

Equipment selection, central station, unitary systems, air distribution, basic principles of air flow, laws, ductwork, duct systems, duct sizing, distribution in rooms, cleaning methods, air flow measurement and balancing, hot water heating, boilers, types of systems, selecting heating units, system design.

APPLIANCE SERVICING

AP 100 LAUNDRY EQUIPMENT (3)

Theory and operation of laundry equipment and assembly and disassembly of wringer washers, automatic washers, dryers and water heaters, fault finding and repair procedure, circuit tracing, circuitry, service analysis, customer relations.

AP 101 KITCHEN EQUIPMENT (3)

Theory and operation of kitchen equipment, assembly and disassembly of ranges, dishwashers and garbage disposal units, circuitry, fault finding, and repair procedures.

AP 102 REFRIGERATION (6)

Fundamentals, compression system of refrigeration, refrigerants, liquid feed devices, evaporators, compressors, condensers, electric motor controls, defrosting methods, food preservation, air conditioning, humidity in refrigeration, heat load calculations, absorption system of refrigeration, use and care of refrigeration tools and equipment, making refrigeration joints, aluminum welding, evacuating, charging, leak testing. Dismantling and assembling refrigerators and air conditioners, rework of hermetic compressors, adjustments, maintainance service analysis, repair of refrigerators, air conditioners, ice makers.

ARCHITECTURE

ARCH 100 MATERIALS AND METHODS (3)

The manufacture and use of cement, steel, brick and clay tile, plywood and timber, lime and gypsum, glass, plastic laminates, cast iron, malleable iron, copper, insulations, roofing materials, concrete design and control of mix, building construction, terminology and techniques.

ARCH 200 MATERIALS AND METHODS (2)

Practical application of building materials as used in the architectural building trades by lecture and application: contents specification, BCI (Builders Construction Index), filing system.

ARCH 201 HISTORY OF ARCHITECTURE (1)

A review of the historical background of architecture from primitive man to the contemporary, with emphasis of Egyptian, Byzantine, Greek, Roman, Gothic and the Renaissance. Field trips to the Royal Ontario Museum and local architectural examples.

BAKING

BAK 10 BAKING I (11)

Introduction to baking, sanitation and hygiene, safety, tools and equipment, storage, refrigeration and freezing, theory of baking, trade terminology, commodities, theory of basic ingredients, flour, sugar, fat, eggs, milk, salt, chocolate, nuts, leavening and thickening agents, jams and spreads, flavours and colours, practical training in the bakery and in the foods lab, preparation of basic products such as biscuits, muffins, bread and rolls, sweet yeast and Danish doughs, pies and tarts, fillings and icings, pastries, cookies and cakes.

BAK 20 BAKING II (11)

New materials, ready-made mixes, time saving techniques, fermentation and retarding of yeast doughs, freezing procedures, quality control, costing, wrapping and storing of baked goods, preparation of special bakery products in the lab, French pastries, petit fours, creams and icings, chocolate and marzipan work, decoration of cakes for various occasions, gum paste, techniques of decorating dummies for display purposes and showpieces.

BARBERING

BAR 10 THEORY (7)

Sanitary science; use of germicides, use of antiseptics, personal hygiene, shop hygiene. Basic knowledge; manufacture, use of parts, proper manipulation of combs clippers and shears, kinds, temper, sizes, safety factors of razors, manufacture, quality, proper use of hones and strops. Basic theory; cells, digestion, circulation, bones of the head, muscles, nervous system, skin, shedding, regrowth of hair, light therapy, hair, scalp and skin ailments, theory of massage.

BAR 11 PRACTICE (7)

Haircutting, shape of heads, texture of hair, stroking, facials, application of creams, manipulation, shampooing, suitable solvent for different scalp conditions, scalp treatments, recognition of diseases, application of high frequency current. Shop management; regulations governing shop ownership, location, simple bookkeeping, equipment, supplies. Professional ethics; developing personality, developing tolerance, understanding and respect for competitors, maintaining harmony among shop personnel.

BUSINESS MACHINES

BM 100 TYPEWRITERS (6)

The various makes and models of typewriters available and their basic differences, the principle operation of each machine, corrections, major type, styles and pitches, assembling and adjusting of the keyboard and impression control, carriage, escapement, universal mechanism, ribbon drive, bichrome mechanism, tabulator mechanism, comparison between standard and electric machines, repeat and non-repeat power aims, carriage return mechanism, power driven feature keys.

BM 101 ADDING MACHINES (6)

Introduction to the basic principles and construction of adding machines how an adding machine adds, various operations performed on adding machines, operating methods, manual and power operated, advantages and disadvantages of each, types of machines, ten key and full keyboard, advantages and disadvantages of each, methods of printing, disassemble, study and assemble individual units, keyboard, printer, accumulator, accumulator rack, mainshaft drive, motor and power transmission, machine adjustments, trouble shooting, tape reading, customer relations.

BM 102 PHOTO-COPY MACHINES (2)

Theory of photo copy machines, disassembling and assembling, checking, trouble shooting, repairing, adjusting and replacing parts, safety precautions, customer relations.

CARPENTRY

CAR 10 CARPENTRY I (6½)

Tools and their maintenance, preparation of materials; timber, growth, structure, recognition, conversion, seasoning, grading, defects, application; joints, classification, layout and application; fastening, power and hand nails, screws, accessories; adhesives, types, composition, manufacture, preparation, application; abrasives, types, manufacture, hand, portable and machine sanding.

Shop and bench procedures, lay-out rod or board, detailing, order for milling, assembly methods; doors, sizes, types, construction, hanging; jambs, types, dimensions, erection; general hardware and application; intersection of mouldings, sections, use of mitre box, application; framing square, description, principles, markings, application; arches, centres, power tools, applied shop projects, safety, practical geometry.

CAR 20 CARPENTRY II (6½)

General construction, wall plates, floor construction, wall framing, insulation, roof framing, exterior trim and finishes; window frames, frame and masonry, trim around frames; sash, stock sizes, types, construction, order and fitting; inside partition, wall and ceiling treatments, floor coverings, use of level, power tools; applied shop projects, safety, practical geometry.

CAR 30 CARPENTRY III (6½)

Building permits, by-laws, building codes, general survey and registration of lands, soil condition, site-layout. Residential and commercial, use of transit. Excavations, drainage. Concrete practices, footings and foundation, columns, beams, sills, floors, form work, and application. Stair building, power, tools, applied shop projects, safety, practical geometry.

CHEF TRAINING

CHEF 10 CHEF TRAINING I (11)

Theory of Food: sanitation and hygiene, safety, equipment, refrigeration, basic cooking methods, basic nutrition, culinary terminology. Kitchen Practice and Foods Laboratory — main kitchen: basic flavouring, herbs and spices, basic stocks and sauces, soups, eggs, pasta and rice dishes, basic preparation of meat, poultry and fish, garnishes, potato and vegetable cookery. Larder: butchering, vegetable preparation, salads, dressing, Bakery: basic principles in baking, quick breads, yeast leavened doughs, pies, tarts, cookies, puddings, jello, cakes, banquet preparation and service.

CHEF 20 CHEF TRAINING II (11)

Theory of Food: purchasing, menu planning, culinary terminology, receiving, storage and issuing, portion control and costing, logic of cookery. Kitchen Practice and Food Laboratory — main kitchen: culinary basics, derivatives of basic sauces, consomme, bisques, cold soups, fish and seafood, game cookery, meat and poultry, garnishes, derivatives of sauce mayonnaise, marinades, chould-froid sauces, farces and mousse. Bakery: basic preparation in the patisserie, basic pastes, cakes, souffles, steamed and baked pudding, ices, petit fours, fresh fruit dessert, cake decorations, banquet preparation and service.

CHEMISTRY

CHEM 100 GENERAL CHEMISTRY (2)

Methods of Chemistry: physical and chemical changes, chemical terminology; Organic Chemistry: structure and reactions of common aliphatic groups; States of Matter: gas laws, partial pressure; Nuclear Chemistry: basic nuclear particles, isotopes, radioactivity, half life, radio-isotopes and uses; Equilibrium: rate of reaction, reversibility, Le Chatelier's Principle, equilibrium constants, solubility as an equilibrium process, methods of expressing solubility and concentration, ion exchange; Acidimetry and Hydrolysis: definition, pH, indicators, titration, relation to oxidation and reduction; Electrochemistry: electrolysis, Faraday's Law, electrochemical series, corrosion.

CHEM 101 CHEMISTRY (2)

Introduction, classification of matter, properties of gases, atomic theory, chemical formulas and equations. Atomic and molecular structure. Chemical terminology, the periodic table, properties of liquids and solids. Solutions. Rate of reaction and chemical equilibrium, ionic theory and electrolysis. Descriptive chemistry, corrosion and protection of metals. Calculations and problems.

CHEM 120 CHEMISTRY (1)

Introduction to chemistry, physical and chemical changes in solids, liquids and gases, kinetic theory, chemical reactions, molecules, atoms, neutrons, protons, electrons, detailed reference and experimental proof of their existence. Structure of the atom, periodic tables. Valences, compounds, formulas, equations, nomenclature. Metals and metalloids, oxides, bases, acids and salts (based on demonstration and class experiment). Ionization, acid base and neutralization. P.H. Problems, an inductive study of the formula derived from the experiments; limitations of the laws and reference to the Van-der-Waals formula.

Fundamental laws of chemistry, conservation of mass, and energy, definite and multiple proportion; Avogardro's law, mole concept; atomic weight, equivalent weight; Dulong and Petit rule.

Experiments, chemical interpretations and calculations.

Equilibrium. Rate of reaction. Study of the principal elements and their compounds. Localization of the elements in period tables, intelligent guess and experimental investigation, occurrence, study of the compounds, organic chemistry, role of the elements and compounds in biological and economical life; problems. (One semester)

CHEM 121 CHEMISTRY (1)

Mixtures and compounds, physical and chemical change. Constitution of air and its properties. Oxygen and oxides. Combustion and respiration. Water — composition. Solution — solids, liquids, gases, colloids, hydrogen. Chemical laws of combination — atomic theory; atomic and molecular weights, symbols formula equations. Atomic structure, valancy. Acids bases and salts. Nitrogen and ammonia. Sulphur: its oxide, sulphuric acid sulphates. Carbon: its oxides, carbonates and bicarbonates. Chlorine: hydrochloric acid, chlorides. Water testing, hardness and its cause. Base exchange, lime soda process. Allealinity chlorides phosphate dissolved oxygen sulphates. (One semester)

CHEM 122 CHEMISTRY (1)

Chemistry of hydrocarbons, nature of petroleum benzine. Introduction to electrolysis. Meaning of WH determination. Theory of metallic corrosion fitting, wasting caustic embittlement corrosion by gases and scale formation. Methods of protection; treatment of feed water, metallic surfaces. (One semester)

CHEM 210 CHEMISTRY — POLYMER (3)

Basic concepts. Molecular forces and chemical bonding. Functionality. Molecular weight and its distribution. Configurations and conformations. Morphology. Addition and condensation polymerization. Copolymerization. Method for determining molecular weights. Polymerization techniques. Degradation of polymers. Natural, organic and inorganic polymers.

Rheological properties and processing of polymers, instruments for measuring rheological properties. Newtonian and non-Newtonian fluids, types of flow, polymer solutions and dispersions. Associated laboratory experiments.

CHILD CARE

CHI 160 FIELD PRACTICE (8)

Every student undergoes continuous supervised practical training in an institutional setting. First year students spend two days a week in their field placements.

This practical experience is of central importance in preparing students for specialized work with emotionally disturbed and handicapped children. Regular supervision is given by senior staff members of the institution and by course instructors.

Field practice affords the students opportunities to take part in the hour to hour care of children under the guidance of experienced staff, who interpret the behaviour and special treatment needs of the children.

CHI 161 PROGRAM PLANNING (3)

Leadership roles and the structure and cohesion of groups are studied to give insight into the dynamics of groups. Students become competent in the area of children's play and recreational activities. A wide range of art and craft media is explored; a repertoire of children's games built up; musical and group singing talents are encouraged and the use of drama with children is considered.

CHI 162 THE SOCIAL SERVICES (2)

Students are introduced to the legal aspects of Child Care and protection and become familiar with provincial legislation. Theory is re-informed by the visits to agencies, institutions and hospitals in the vicinity representing health, welfare, education, and correctional services. Community services to families and children, foster home and group home care are examined in the light of contemporary needs and provision.

CHI 163 HEALTH AND FIRST-AID (2)

The course deals with the maintenance of child health; the effect of emotional problems on physical growth, accident prevention and communicable disease control. Techniques in simple nursing procedures are practised in order to give care to the unwell child.

The Standard Red Cross First-Aid Course is taught, with certification after successful examination.

CHI 164 PROFESSIONAL DEVELOPMENT (1)

Discussions, guest speakers, tours, designed to increase the student's knowledge of the child care field.

CHI 260 FIELD PRACTICE (12)

A continuation, at the second-year level, of the field work in CH1 160. Three days a week.

CHI 261 PROGRAM PLANNING (2)

A continuation, at the second-year level, of the work of CH1 161.

CHI 262 THE THERAPY OF PLAY (1)

Characteristic forms and patterns of play throughout the years of childhood and adolescence are reviewed and considered in the light of their therapeutic value. Students are guided in the diagnostic and interpretative use of play with disturbed and handicapped children.

CHI 264 PROFESSIONAL DEVELOPMENT (1)

A continuation of the program of CHI 164.

CIVIL ENGINEERING

CIV 100 CONSTRUCTION MATERIALS AND METHODS (3)

Wood, masonry, asphalt, concrete, reinforced concrete, structural steel, plan interpretations of structural drawings, foundations, footings, framing plans, schedules, details, plan study of bridges, types, materials of construction abutments, earthwork quantities, mass diagrams and identification of soil types.

CIV 200 STRUCTURAL STEEL (3)

Fundamental principles underlying design in structural steel, strength of materials and structural analysis pertaining to ties, columns, bolted, welded and rivetted connections, beams, struts, arches, truss and simple frames, pressure vessels, storage tanks, receivers and towers.

CIV 201 **CONCRETE (3)**

Reinforced concrete, concrete beams, columns, lintels, floors, walls, engineering and placing drawings, reinforcing materials, accessories, detailing practices in steel, reinforced concrete and wood.

CIV 202 **MUNICIPAL SERVICES (3)**

Hydraulics: a study of water flow; factors, Manning's formula; pipes — types, manufacture, laying, backfilling, hydraulic characteristics; storm and sanitary sewers; hydrology; run-off; appurtenances; control schemes for flood control; sewage plants; watermains — location, pumps, valves; filtration plants; roads; drainage; sidewalks; municipal planning; codes and specifications.

CIV 203 **HIGHWAY DESIGN (3)**

Highway location, photogrammetric interpretation, route plans and profiles, horizontal and vertical curves, grades, cross sections, cut and fill, transition curves, curve selection, specifications, signs, signals and markings as related to highway and traffic engineering.

CONSTRUCTION

CO 100 **BUILDING CONSTRUCTION AND DRAFTING I (4)**

Site selection, excavation, soils and simple tests, dewatering well points, footings, grade beams, grillage foundations, piles, caissons, water-proofing, damp-proofing wood joints, sub-floor, roof carpentry, construction equipment, power and hand tools, scaffolding, hoists, shores, sheeting, needling, underpinning, winter protection, field trips to study construction procedures, detailing construction elements, drawing interpretation, systems and types of construction.

CO 101 **QUANTITY SURVEYING I (5)**

Use of quantities, scales, duodecimals, methods of measurement, Canadian method of measurement for building works, excavating and backfill, concrete, masonry, rough carpentry, painting, floor covering, acoustical work, plaster work, take-off and calculation of simple structures.

CO 102 **MECHANICAL INSTALLATIONS I (3)**

Water, sewage disposal, store drainage, pipe sizing, traps, fall, piping materials, couplings, joints, water pressure, plumbing layout, fixtures, ventilation, sprinklers.

CO 103 **CONSTRUCTION MATERIALS (2)**

The manufacture and use of cement, steel brick and clay tile, plywood and timber, lime and gypsum, glass glazing and caulking, plastic laminates, cast iron, malleable iron, copper, insulations, roofing materials, concrete design and control of mix.

CO 104 **CONSTRUCTION SURVEYING (2)**

Use of level, transit, etc., hand levels, the level, its use, chaining, transit, use and adjustment, measuring horizontal and vertical angles, setting out buildings, offsets, curves, contours, earthwork quantities.

CO 200 **BUILDING CONSTRUCTION AND DRAFTING II (3)**

Reinforced concrete, structural steel, laminated timber, stone, roofing and sheet metal, partitions, doors, windows, window wall, panelling, plaster and drywall, acoustics, insulation, construction equipment, construction organization; the architect, structural engineer, mechanical and electrical engineers, field trips to study construction procedures, drafting detailing construction elements outlined above.

CO 201 **QUANTITY SURVEYING II (4)**

Canadian method of measurement, reinforced concrete, structural steel, advanced masonry and stone, carpentry and millwork, terrazzo and tile, analysis of prices, pricing, overhead and profit, discounts, analysis of sub-contract bids, organization of estimating department, take-off and pricing of several trades.

CO 202 **MECHANICAL INSTALLATIONS II (2)**

Principles of heating and air conditioning, types, heat loss and gain, calculations for buildings, humidity, relative humidity, ductwork, dampers and diffusion, air pollution, electrical equipment, principles of lighting, types of fixtures and wiring, transformers, floodlighting, underfloor duct and distribution systems.

CO 203 **CONTRACTS AND SPECIFICATIONS (2)**

Contracts, contract law, standard forms, sub-contracts, purchasing, penalties, arbitration, liens, decision of architects, engineer or owner, changes, extras and credits, sample contracts, purchase orders, change orders, specifications: purpose and objectives, method of typical draft specification, standard specification, tender documents, bid and performance bonds.

DENTAL

DENT 160 **DENTAL LAB I (basic) (14)**

Dentures complete: acrylic trays, master model, bite rims, articulation, setting teeth, repairs, relives, remakes. Denture partial (resin): trays, models, rims., etc. Denture partial (cast): acrylic trays, master model, bite rim, articulation, survey, design, duplicate to refractory model, fabricating plastic or wax forms to design, investing, heating, casting, finishing, polishing. Bridgework: handling impressions, dies, models, bite preparation for articulation, waxing dies for acrylic veneers, acrylic crowns, gold crowns, investing, heating, mould, casting, trimming, polishing, packing resin. Bridgework—Precision attachment: acrylic trays, dies transfer copings, assembling dies into copings, master model, adjusting bite for articulation, waxing abutments with preparation for boxing, fitting attachment in boxing and soldering, fitting and soldering completion of attachment work to partial castings. Ceramics: dies, master model, bite preparation for articulation, adapting platinum foil, building and fusing of porcelain. Metal ceramics: dies, master model bite preparation for articulation, casting gold crowns, fusing porcelain to crown. Orthodontics: master model, fitting clasps, labial and/or lingual arch, springs for movement of teeth, expansion screw.

DENT 161 **DENTAL MATERIALS (2)**

A comprehensive study of physical and chemical properties of dental materials such as gypsum products, impression materials, resins, waxes, investments, etc. — proper weighing, measuring and manipulating of materials.

DENT 162 **DENTAL ANATOMY (2)**

Outline of anatomy of the teeth, drawings of each tooth from central incisor through the second molar. Teeth are carved completely including root portions.

DENT 260 **DENTAL LAB II (14)**

Similar to DENT 160 but at an intermediate level.

DENT 360 **DENTAL LAB III (20)**

Similar to DENT 160 but at an advanced level.

DRAFTING

DR 10 **DRAFTING (½)**

Reproduction process, three view drawing, use of instruments, alphabet of lines, invisible edges, dimensioning, sections and material symbols, freehand sketching, introduction to isometric drawing.

DR 14 DRAFTING (½)

Blueprint reading and drafting: Orthographic projection, conventional lines, freehand sketching, types of sections, conventions and material symbols, auxiliary views, basic methods of dimensioning.

DR 18 DRAFTING (½)

Use of instruments, geometrical shapes and construction, lettering, orthographic projection, isometric drawing, freehand sketching.

DR 20 DRAFTING (½)

Plan study of frame, masonry and concrete construction regarding materials, construction members, methods of dimensioning, sections, details, schedules, and architectural standard symbols.

DR 24 DRAFTING (½)

Aligned Projection: aligned, revolved and auxiliary sections; dimensioning of holes, threads, fasteners, basic welding symbols.

DR 28 DRAFTING (½)

Auxiliary views, sections assembly drawings, drill and drill systems, materials, introduction to working drawings, conventions and notes, piping symbols.

DR 30 DRAFTING (½)

Preparation of simple floor plans for masonry construction, brick coursing for window and door openings, wall sections and details, sections and details for steel frame construction.

DR 31 DRAFTING (½)

Drawing of frame wall section, stair layout from floor plans and material estimates, form work details.

DR 32 DRAFTING (½)

Electrical symbols, residential wiring with reference to the electrical code regulations, estimating material from plans, introduction to commercial or industrial electrical drawings including single line drawings, wiring diagrams, control circuits, wire schedules, grounding systems.

DR 33 DRAFTING (½)

Types of piping drawings, single line, double line, isometric, pipe fabrication, drawings, piping symbols, plan reading of steam and hot water systems, boiler room piping and diesel engine, pipe hangers.

DR 34 DRAFTING (½)

Specifications of materials, structural steel shapes, piping symbols and piping drawings, welding drawings, tolerances and surface finishes.

DR 35 DRAFTING (½)

Room, door and window schedules, interior wall elevations, estimating wall and ceiling surface areas, estimating cost of decoration.

DR 36 DRAFTING (½)

Representation of structural materials used in metal lathing, preparation of large scale details of various partitions, large scale details of column and beam furring, details of suspended ceilings, light troughs, reflected ceiling plans.

DR 37 DRAFTING (½)

Piping symbols, isometric drawing of drains, venting and fixtures, isometric drawing of complete plumbing systems, layout of complete septic tank system.

DR 38 DRAFTING (½)

Assembly drawings: interpretation of shop and industrial prints, isometric piping and ducting layouts, plan reading of construction of blueprints, architectural symbols, graphs, mechanical plans for air conditioning systems.

DR 39 DRAFTING (½)

Determining sizes of round duct work by calculation and graphically drawing floor plans and laying out trunk and branch ducts, sizing and estimating materials required.

DR 100 TECHNICAL DRAWING (2)

Instruments and materials, geometrical constructions, theory of projection drawing, orthographic projection, multi-view and axonometric, descriptive geometry, auxiliary views — single and double, rotation, sections, dimensioning, technical sketching, intersections and developments, oblique projections, shop processes, work drawings, reproduction of drawings, blueprint reading, drafting office routine.

DR 101 MECHANICAL DRAWING (5)

Dimensions and notes, sectioning, conventions and standards, materials, S.A.E. numbering system, tolerances, limits, machine fits, finishes, fasteners, keys and springs, heat treatment of steels, small tool operations, welding practices, gears and cams, manufacturing processes, production techniques, pictorial drawing and sketching, detail drawings to latest industrial practices.

DR 102 ARCHITECTURAL DRAFTING (6)

Review of lettering, dimensions, symbols and conventions as applicable to architecural drafting. Construction methods and use of materials for masonry and frame construction, stairs, chimney and fireplaces, floor and roof construction, millwork, windows and doors and interior partitions. Interpretation of building by-laws and use of R.A.I.C. filing system. Preparation of working drawings of plans sections, elevations and details of frame and masonry construction from preliminary drawings and design sketches. Elements of lathing, plastering and bricklaying and mechanical installations of plumbing, heating and electrical systems. Sketching and delineation of presentation drawings and construction of presentation scale models. Building code interpretations and application form an integral part.

DR 103 ELECTRICAL DRAFTING (5)

Review of drafting procedures, orthographic and isometric projection, electrical symbols, preliminary studies of residential, commercial, and industrial layouts. Wiring systems for single and three-phase layouts. Theory and calculations of lighting layouts and types and rises of lighting fixtures. H.E.S.C. rules and regulations.

DR 104 PIPING DRAFTING (5)

Steam distribution system, high pressure systems for steam generating stations, surface condenser, low pressure boiler unit heater, radiant heat, feed pumps, nuclear pile cooling, bulk storage, city water supply to standpipe systems, chilled water air conditioning, refrigeration plant cooling, compressed air systems, distillation piping, sulfate pulping process system, vapourizer hook-up, etc.

DR 111 MECHANICAL DRAFTING (3)

Detailed working drawings, dimensioning, tolerances, conventions and standards. Materials, S.A.E. numbering system, heat treatment of steels, pictorial drawing of processes, machine finish clearance, class of machine fits, small tool operations, manufacturing processes, production techniques.

DR 112 ARCHITECTURAL DRAFTING (3)

Lettering, dimensioning and notes, symbols, conventions, preliminary studies and drawings of foundations, floor plans, and sections for various types of construction, details and sketching.

DR 113 DRAFTING (1)

Neatness and accuracy, care of instruments; lines and angles, measurement and bisection; division of a line; construction and use of scales, the diagonal scale. Construction of plane figures, triangles, regular and irregular polygons; enlargement and reduction by ratio of sides. Properties of the circle and its tangents; the ellipse; the parabola. Solid geometry; orthographic projection of regular solids: cube, cylinder, triangular, and hexagonal prisms and pyramids. (One semester)

DR 114 DRAFTING (1)

Section, surface development and auxiliary views of regular solids including the cone. Orthographic projection of simple brackets and component machinery parts. Isometric projection, free hand sketching of simple machine parts. Standard conventions. (One semester)

DR 115 STRUCTURAL STEEL DETAILING (2)

Structural steel and its fabrications, framing of simple beams, special beam connections, welding procedures, dimensions for detailing, framing plans, structural steel detailing practices.

DR 120 DESCRIPTIVE GEOMETRY I (2)

Theory of multiview projection, single and double auxiliary views, cartesian co-ordinate system of locating points in space, true length of oblique lines, principal lines, bearing and slope of a line, problems involving parallel lines, intersecting lines and skew lines, problems involving points and lines, plane surfaces, edge views, true shape by auxiliary view method, a point in a plane, shortest distance problems, dihedral angles, locating a given figure in a plane, location of a circle on a plane by the edge view method.

DR 121 DESCRIPTIVE GEOMETRY (2)

Orthographic projection, principal views, alternative positions, primary and secondary auxiliary views, isometric sketching, basic principles involving points, lines and planes, true shapes found by auxiliary view and revolution methods, strike and dip of a stratum, apparent dip, bore holes. Problems involving tunnels, sewers, slopes, ore veins and outcroppings, etc.

DR 130 BLUE PRINT READING (2)

Freehand sketching: freehand sketching of simple and complex objects using multiview, isometric and oblique projections; blueprint reading; study of methods of representation of objects including orthomultiview, isometric and oblique projection, dimensions and tolerances, notes and specifications, surface finish, auxiliary views, sections, threads and fasteners, gears and cams, simple developments, detail and assembly drawings, methods of reproduction of drawings.

DR 131 DRAFTING (2)

Drafting equipment, use of instruments, geometrical shapes, terminology, lettering, orthographic projection, dimensioning, pictorial drawings, auxiliary views, mechanical drawing, graphs, construction drawings, elevations, sections, piping drawings, mechanical plans for air conditioning.

DR 132 DRAFTING (2)

Drafting equipment, use of instruments, geometrical shapes and construction, orthographic projection, dimensioning, sections, auxiliary views, isometric drawing, piping drawing — flow diagrams, single line and double line layouts, isometric piping, fabrication drawings, construction drawings.

DR 133 ELECTRONIC (2)

Use of instruments, orthographic projection, lettering, dimensioning, sectioning, sketching and isometric drawing. Application of graphical symbols in point-to-point, highway, airline diagrams. Description of cableforms, wire harnesses and locking devices. Materials and finishes, chassis and panel design and layouts. Printed circuit design and techniques. Electronic assemblies, graphs and charts. Mecroelectriconics. Introduction to industrial electronics and electrical drafting.

DR 134 PATTERN LAYOUT (2)

Drafting equipment, use of instruments, geometrical shapes and terminology, lettering, orthographic projection; theory, dimensioning, projects. Geometrical constructions, parallel line developments; simple cylinders. Radial line development: cones, notched cones, pyramids, reducers, etc. True length of lines by auxiliary view method and revolution method, triangulation, truncated pyramids.

DR 135 DRAFTING (2)

Drafting equipment, use of instruments, geometrical shapes, lettering, orthographic projection; theory, principal planes, missing lines and views. Welding symbols as per American Welding Society and Canadian Standards Association. Materials: structural steel shapes and symbols, aluminum rolled and extrusions, standard sizes, dimensioning, principles for working drawings, dimensioning, projects, tolerances, small tool operations, assembly drawings, interpretation of drawings, introduction to common architectural symbols.

DR 136 DRAFTING (1)

Drafting equipment, use of instruments, geometrical shapes and construction, orthographic projection, dimensioning, sections, auxiliary views, isometric drawing, piping drawing — flow diagrams, single line and double line layouts, isometric piping, fabrication drawings, construction drawings. (One semester)

DR 140 BLUEPRINT READING (1)

Freehand sketching: freehand sketching of simple and complex objects using multiview, isometric and oblique projections; blueprint reading; study of methods of representation of objects including orthomultiview, isometric and oblique projection, dimensions and tolerances, notes and specifications, surface finish, auxiliary views, sections, threads and fasteners, gears and cams, simple developments, detail and assembly drawings, methods of reproduction of drawings. (One semester)

DR 141 MECHANICAL DRAFTING (4)

Detailed working drawings, dimensioning, tolerances, conventions and standards, materials, S.A.E. numbering system, heat treatment of steels, processes, machine finish, clearance, class of machine fits, small tool operations, manufacturing processes, production techniques.

DR 142 ARCHITECTURAL DRAFTING (4)

Foundations and floor plans for various types of construction, typical wall sections, window and door details, stairway construction detailing, fireplaces and chimney, floor systems, roofs, cornices, parapet walls, use and preparation of shop drawings, perspective drawing, rendering.

DR 143 ELECTRICAL DRAFTING (2)

Introduction to and general instructions of electrical drafting; electrical symbols; schematic and wiring circuit diagrams; layout for incoming services, switchboards, and outdoor substations; illumination; introduction to industrial plant electrical drawings. Electronic symbols; circuit diagrams; schematic and wiring layouts.

DR 144 SURVEY DRAFTING (2)

Types and units of measurement, bearings and azimuths, legal and topigraphic plans, site plans, route plans and profiles, gradients, levelling use of level.

DR 145 STRUCTURAL DETAILING (2)

Tension members, compression members and beams, structural steel, shapes, use, properties, dimensions for detailing, framing plans, structural steel detailing practice, reinforced concrete framing plans, detailing reinforced concrete beams, columns, lintels, slabs, walls. (One semester)

DR 146 **DRAFTING (2)**

Drafting equipment, use of instruments, geometrical shapes, terminology, lettering, orthographic projection, dimensioning, pictorial drawings, auxiliary views, mechanical drawing, graphs, construction drawings, elevations, sections, piping drawings, mechanical plans for air conditioning. (One semester)

DR 150 **DESCRIPTIVE GEOMETRY (2)**

Orthographic projection, primary and secondary auxiliary views, basic descriptive geometric principles, points, lines, planes, true lengths and true shapes found by auxiliary views and by revolution, skew lines, piercing point of a line and a plane, development of surfaces by parallel line, radial line and triangulation methods, pattern drawing for sheet metal and plate fabrication, seam allowances, bends, materials and production methods, welding symbols, welding drawings, structural shapes and bills of material.

DR 201 **MECHANICAL DRAFTING II (3)**

Advanced problems including assembly layouts with specifications for materials, mechanical services, welding drawings, piping and pumps, engineering materials, production methods, manufacturing processes, checking procedures, measuring instruments, S.A.E. codes, practical problems.

DR 202 **ARCHITECTURAL DRAFTING III (4)**

Review of first year work, working drawings of commercial, industrial and institutional buildings, details of foundations, masonry and curtain walls, structural steel, reinforced concrete and laminated wood details, schedules, custom details, mechanical equipment, sanitary services, electrical services, presentation.

DR 203 **ELECTRICAL DRAFTING II (3)**

Layout of switchboards, distribution systems, central systems, electric heating systems, and heat loss calculations. Meters, mechanical design of related electrical equipment, transmission towes. Electronic equipment including chassis layouts and printed circuits. Production drawings for electrical installations for residential, commercial and industrial projects.

DR 204 **PIPING DRAFTING II (3)**

Commercial, industrial and institutional layouts consisting of working drawings and schematics both single and double line representation for generation plants, breweries, distilleries, chemical processes and refineries. Estimating piping costs.
Flexibility of piping, analysis and calculation related with placement of hangers and restraints, and layout of pipe.

DR 205 **ELECTRONIC DRAFTING (3)**

Review of principals of drafting design tolerance and materials reliability of components. Electronic symbols, diagrams transistor circuits, component layouts, selection of components and positioning of components. Wiring layouts, types of wires, wiring and production methods. Printed circuits, testing vibration and environmental effects.

DR 220 **DECRIPTIVE GEOMETRY II (2)**

Plane surfaces, intersection of a line and a plane, intersection of two planes, intersection of planes and polyhedrons, location of a line perpendicular to a plane, dihedral angle between two oblique planes, shades and shadows, visualization of lines and planes, revolution of points, lines and planes, intersection and development of surfaces, using parallel line development, radial line development, and triangulation, practical pattern development problems.

DR 221 **DESCRIPTIVE GEOMETRY (2)**

The location of points and lines in a plane, the slope of a plane, problems involving skew lines, intersection of two planes, intersection of lines and planes, dihedral angles, intersection of surfaces — plane and curved, cutting planes, location of workings, intersection of views, faults, outcrops, profiles and sections, contours, cuts and fills along level roads and along a grade road, practical problems and drawing practice, revolution and counter-revolution methods of solving practical problems.

DR 222 **DESCRIPTIVE GEOMETRY (2)**

Problems involving the shape of oblique surfaces, lines in a plane, intersections of lines and planes, intersections, developments, tangent lines, intersection and developments of a practical nature involving the use of triangulation, bend allowances, welded joints. Theory of multiview projection, single and double auxiliary views, basic descriptive geometric problems, true length of oblique lines, practical problems, vector geometry; parallelogram of forces, co-planar concurrent forces, parallel forces, bow's notation, space vectors.

DR 223 **DRAFTING (1)**

Loci, simple problems on Loci; slides crank mechanisms, etc., points and lines in space. Interpenetration of surfaces, curves of interpenetration of regular solids with axes at right angles. Fastenings: bolts, nuts and studs, standard screw threads, keys, cotters, pins, rivets and riveted joints, welded joints. Bearings: pedestal and footstep, ball and roller, lubrication. Couplings: simple shaft couplings, universal couplings, etc.

DR 224 **DRAFTING (1)**

Engineering details: simple machine tools, steam and other engine details, e.g. pistons, piston and connecting rods, stuffing boxes, crossheads and slides, slide valves and cranks. Types of valves and components for fluid systems. Standard symbols.

ECONOMICS

EC 10 **SMALL BUSINESS MANAGEMENT (2)**

Business Mathematics: fundamental operations, fractions, percentage, discount, profit and loss. Basic bookkeeping: taxation, interest, the journal and the ledger, the work sheet and financial statements, special journals and accounts. Business practice: retailing, insurance, investments, taxes, licensing, leases, bankruptcy and insolvency, causes of business failure, wage earners lien, sales promotion. Forms of organization: individual and partnership, corporation and co-operative.

EC 100 **ECONOMICS (2)**

Forms of economic organization: strength and weaknesses of each. Forms of business organization, supply and demand, money and banking, international trade, personal finance, public finance, social services, labour, business cycles and national accounts, retailing, policies, contracts, credit, competition. Insurance: business, all aspects, personal policies. Investments: stocks, bonds, annuities. Civics, federal, provincial, local, responsibilities, jurisdiction. Basic bookkeeping: balance sheet, journal, ledger, work sheet, classified financial statements, special journals, accounts receivable, accounts payable, payroll. Business law: contract, licensing, bankruptcy, loans, taxes, liens, options. Sales: proven promotional plans and policies.

EC 130 **SMALL BUSINESS MANAGEMENT (2)**

Business Mathematics: fundamental operations, fractions, percentage, discount, profit and loss. Basic bookkeeping: taxation, interest, the journal and the ledger, the work sheet and financial statements, special journals and accounts. Business practice: retailing, insurance, investments, taxes, licensing, leases, bankruptcy and insolvency, causes of business failure, wage earner's lien, sales promotion. Forms of organization: individual and partnership, corporation and co-operative.

EC 200 **ECONOMICS (2)**

Principles of economic analysis, economic institutions, and issues of economic policy. Allocation of resources and distribution of income through the price system; aggregative economics, including money and banking, national income, and international trade.

EC 210 ECONOMICS I (1)

Basic economics and industrial organization: forms of economic organization and their strengths and weaknesses. Monetary theory — money, credit and banking, Canadian banking system. Forms of business organization and business financing. (One semester)

EC 211 ECONOMICS II (1)

Supply and demand business cycles and compensatory countercyclical fiscal policy. Labour economics. Insurance. Civics — organization of federal, provincial and municipal government. The place of the food service industry in the economic structure of the nation. (One semester)

EC 300 BUSINESS MANAGEMENT (2)

The manager's function in the organization and operation of a business. Pitfalls to be avoided; problems of planning; providing the capital; organization of the business; purchasing the stock; record keeping; credit and collections; depreciation and profit; insurance, merchandising; advertising and sales; employment and personnel; business control; relations to the community. Both large and small businesses are considered, with emphasis on the latter.

EDUCATION

ED 160 TEACHING TECHNIQUES (3)

Theories of learning, individual differences, adult learning, subject analysis, lesson planning, curriculum development; lesson types, teaching aids; evaluation, practical work, theory; practice teaching; critical appraisals of teaching techniques. The course is arranged to provide each student with several opportunities for practice teaching and to develop an appreciation of effective techniques. Before attending classes students are advised to read J. R. Kidd, *How Adults Learn,* Associated Press.

ELECTRICAL

EL 10 ELECTRICAL CONSTRUCTION I (6½)

How to use the Hydraulic Gender: Electron Theory; Ohm's Law; Circuit Theory; Communication Devices; Circuit Testing; Power, Chemical Cells: Introduction to H.E.P.C. Regulations; Conductors; Wire Calculations: Services; Control of Lighting Circuits; Wiring Methods; Distribution Systems.

EL 20 ELECTRICAL CONSTRUCTION II (6½)

Magnetism: Electro-magnetism; Power (Introduction) Induction; Direct Current Generators; Direct Current Motors and Controls; A.-C. Theory.

EL 30 ELECTRICAL CONSTRUCTION III (6½)

Alternating Current: theory, systems, equipment.

EL 40 INDUSTRIAL ELECTRONIC CONTROLS (6)

Types of electronic tubes, amplifiers, tube circuitry and application, shop work, power supplies, principle of timers, welding timers, current control with gas tubes, thyraton contactors, ignition contactors, phase shifting, welder heat control, resistance welders, sequence weld timers, synchronous weld timers, shop work, photo-electric relays, heat controls, light dimming controls, principle of speed and voltage regulators, speed regulators for small D.-C. motors, voltage control for D.-C. and A.-C. generators, single-phase and poly-phase power rectifiers, oscillators, inverters, induction heaters, dielectric heaters, high speed light relays, register control servomechanisms, solid state devices and controls.

EL 100 ELECTRICAL FUNDAMENTALS (2)

Basic electrical concepts: electron theory, emf. Ohm's Law, resistance of conductors. Characteristics of D.-C. circuits, Kirchhoff's Laws, power units, efficiency, electromagnetism, the magnetic circuit. D.-C. measuring instruments, electrical measurements and systems of units, electromagnetic induction, Faraday's and Lenz's Laws, principle of rotating machinery, capacitance, alternating current, sine wave, relationship between effective value, average value and maximum value of current and voltage, characteristics of A.-C. circuits, current and voltage as vector quantities, application of the J operator, L.C.R. circuits, power in A.-C. circuits, power distribution systems.

EL 101 ELECTRICAL MEASUREMENTS (2)

Electrical units, experimental and statistical analysis, basic meter movement, measurement of resistance, potentiometers, A.-C. bridge circuits, measurement of inductance, instrument transformers, magnetic measurements, indicating instruments.

EL 102 D.C. MACHINES (4)

Construction, generator principles, armature windings, commutator, armature reaction and commutation, separately excited generators, self-excited generators, inter-poles, compensating windings, generators in series, generators in parallel, motor-action in generators, motor principles, motor types and characteristics, motor controllers, armatures, prime movers, drives, operational care of D.-C. machines, repair of D.-C. machines.

EL 103 ELECTRICAL LAB (4)

Construction and testing of communication and lighting circuits. Experimental Ohm's Law and magnetic projects, wiring methods, distribution centres, D.-C. generators, D.-C. motors.

EL 104 ELECTRICAL FUNDAMENTALS (4)

The nature of electricity, electron flow, effects of electricity, electrical units, Ohm's Law, energy and power, series circuits, parallel circuits, combination circuits, Kirchhoff's Laws, magnetism, electro-magnetism and magnetic circuits, inductance, capacitance, A.-C. fundamentals, use of vectors in A.-C. circuits, A.-C. circuit characteristics, single-phase power, polyphase power.

EL 105 ELECTRICAL FUNDAMENTALS (2)

Simple Electron theory of electric current: simple circuit theory, energy and power, conductors and insulators. Variation of resistance with dimensions and temperature; sources of E.M.F., cells and batteries, simple generators (A.-C. and D.-C.). Basic theory of alternating current, simple motors (A.-C. and D.-C.), control of common types of motors, operation and applications of voltmeters, ammeters, wallmeters and galvanometers. Simple bridge circuits and their use. Simple theory and use of cathode ray oscilloscope.

EL 110 ELECTRICAL FUNDAMENTALS (2)

Electron structure theory, Ohm's Law and D.-C1 circuits, parallels and series, parallel circuits, conductors and insulators, batteries, resistance, magnetism, electro-magnetism, A.-C. theory, inductance and inductive reactance, capacity and capacitive reactance, A.-C. circuits, resonance.

EL 111 ELECTRICAL FUNDAMENTALS (2)

Electron theory, sources of electricity, basic electrical quantities, Ohm's Law and its application, series and parallel circuits, symbols and schematic diagrams, magnetism, electro magnetism, wiring practice, common electrical hazards, motors, transformers, relays, test equipment, service analysis.

EL 112 **ELECTRICAL LAB (1)**

Construction and testing of communication and lighting circuits. Experiments in Ohm's Law and magnetic projects, wiring methods and distribution centres.

EL 121 **ELECTROTECHNOLOGY (1)**

Construction of matter. Electrical changes in basic motion, rates of flow, effects, magnetism, permanent and electro-magnet, basic theory, ferro and non-magnetic materials, force and pole strength, current electricity, units, power, energy, series and parallel, instruments. (One semester)

EL 122 **ELECTROTECHNOLOGY (1)**

Electrolysis, Faraday's Laws, E.C.E., primary and secondary cells, flux density permeability, B.-H. curves, resistivity, conductance, lens laws, electrostatics, field, changes, capacitance. (One semester)

EL 123 **ELECTROTECHNOLOGY (2)**

Energy, conservation of energy, atomic structure, MKS measurement, conductors, insulators, amperes, Ohm's Law, series circuit, parallel circuit; power, work, energy, measurement; calculations; magnetic field, induction; sine wave analysis; generator, alternator, EMF groupings; static electricity; rotating coil, phase, vectors.

EL 133 **ELECTRICAL THEORY (6)**

The nature of electricity, basic electrical quantities, Ohm's Law and its application, electrical circuits, magnetism and electromagnetism, simple electrical generators, electromagnetic generators, circuit elements, power and heating effects, electric motors, transformers and rectifiers, electrical measuring instruments, automation electrical devices and transistors. Electrical circuitry and fault finding. A wide range of small heating and motor-driven appliances are dismanted and repaired.

EL 140 **D.C. MOTORS (3)**

Series, shunt and compound, rewinding fields and armatures, operating principles, characteristics, testing, assembly, soldering. Conversion to D.-C. generators, blueprint reading, electrical symbols, dimensions and tolerances, freehand sketching, electrical circuits. Detail of motor parts, diagrams of coils and coil formers, dimensioning.

EL 141 **SINGLE PHASE MOTORS (5)**

Dismantling, assembling, obtaining and recording rewind data, various connections, testing, general repairs of a mechanical and electrical nature, operating principles and characteristics, connection diagrams. Electric power tools.

EL 142 **THREE PHASE MOTORS (5)**

Dismantling, assembling, obtaining and recording rewind data, star and delta connections and their multiples, testing and general repairs, rewinding, conversions for speed, frequency and voltage.

EL 200 **A.C. MACHINES (3)**

Generators: basic principles, construction, rotor, stator, windings, operation, regulation, efficiency, phasor diagrams, production testing, parallel operation. Polyphase Induction Motors: construction, operation, revolving field, slip, torque, efficiency, circle diagram, production testing. Wound-rotor Induction Motors: construction, operation, testing. Control and protection.

EL 201 **ELECTRICAL DESIGN (2)**

Design of switchboards distribution systems, electrical heating, H.E.P.C. regulations for power transmission and distribution, C.S.A. regulations.

EL 202 **ELECTRICAL LAB (2)**

A.C.-D.C. generators and motor transforms, single and three-phase industrial controls transistors, photoelectric relays, electronic motor controls.

EL 203 **MATERIALS AND PROCESSES (2)**

Wood, steel, aluminum, copper, plastics, glass and etc. Use of materials and methods of production. Various painting processes. Insulators and conductors.

EL 204 **A.C.-D.C. MACHINES (2)**

EL 205 **POWER AND DISTRIBUTION (2)**

Central station systems, transmission systems, distribution systems, power factor control, street lighting, load characteristics, protection, industrial distribution systems, commercial systems, residential systems.

EL 206 **INDUSTRIAL ELECTRONIC CONTROLS (4)**

Electron emission, types of tubes, basic rectifiers, basic amplifiers, oscilloscopes and instruments, phanotrons, thyrations, photo-electric tubes, electronic timers and sequence timers, heat controllers, slope controllers, resistance sensitive relays, power rectifiers, ignitions and ignition contactors, thyraton contactors, basic servo-mechanisms, electronic motor controllers, register controllers, semi-conductors, diodes and transistors.

EL 207 **ELECTRICAL LAB (3)**

Alternators, transformers, single and three-phase motors and controls, industrial electronic controls, transistors, photoelectric relays, timers, electronic motor controls, welder controls, r.f. heating.

EL 210 **ELECTRONIC AND PNEUMATIC CONTROLS (2)**

Electron tubes, diodes, triodes, pentodes, power supplies, audio frequency output stages, detection, intermediate frequency amplifiers, oscillators, converters, RF amplifiers, superheterodyne receivers, applied physics, pneumatic and electronic transmitters, pressure, level, flow and temperature control theory, proportional reset and derivative, temperature measuring devices, filled systems, thermocouple resistance bulbs, potentionmeters, wheatstone bridge, radiation, analysis, speed, pH, humidity chromatography, oxygen analysis, control valves.

EL 221 **ELECTROTECHNOLOGY (1)**

D.-C. machines, generator, motors, excitation starters. Illumination, Kirchhoff's Laws, inductance. Introduction to A.-C. theory, vector analysis, A.-C. instruments.

EL 222 **ELECTROTECHNOLOGY (1)**

A.-C. theory, parallel circuits, resonance, power factor, three-phase circuits, star and delta connection, D.-C. generators, and motors, lap and wave armature reaction commutation, inter-poles. Characteristics of Shunt: series, compound, paralleling, load-sharing, testing.

EL 321 **ELECTROTECHNOLOGY (1)**

Transformers, single and three-phase, auto, double-wound, rotary types, E.M.F. equations, losses and efficiency, regulation. Instrument transformers. Alternators, construction and principles, single and three-phase, simple windings, testing synchronizing load-sharing.

EL 322 **ELECTROTECHNOLOGY (1)**

Synchronous motors, principles, starting. Vee curves, operation, testing, construction. Induction motors, construction operation, three-phase motors of cargo and wound types, T-S curves, starting, speed control, switch gear.

ELECTRONICS

ELTC 100 ELECTRONIC FUNDAMENTALS (2)

Electron tubes: principle of electron tube operation, diode tube, triodes, triode amplifier, parameters, characteristics, tetrode pentode, special types, bases, envelope types, multi-unit types. Power supplies: transformerlesss type, half wave rectifier, full wave rectifier, bridge rectifier, voltage doublers, filter systems.

ELTC 101 AMPLIFIERS (2)

Amplifier circuits (tube types): stage gain, coupling methods, classes of operation, bias methods, load lines, power amplifiers, phase inverters, tone controls, distortion, types and causes, D.B. gain, R.F. amplifiers, grounded grid.

ELTC 102 AM-FM RECEIVER CIRCUITS (3)

Television principles: introduction to television station systems, camera tubes, video signal structure, general receiver characteristics, C.R.T., deflection circuits, high voltage section, sync circuits, video amplifier detector and A.G.C., video I.F. amplifiers, F.M. sound circuits, power supplies, tubers and antennas. Principles of F.M.: producing F.M. mechanically, F.M. terms and definitions, comparisons between A.M. and F.M., reactance modulation, F.M. detectors, pre-emphasis and de-emphasis, F.M. detector alignment, F.M. receivers, F.M. stereo.

ELTC 103 SEMI-CONDUCTOR CIRCUITS (3)

Basic transistor principles: review of atomic theory, semi - conductor physics, doping, semi-conductor diodes, bias techniques, transistor action, transistor configuration, amplifier circuits (transistor types); transistor characteristics, bias stabilization, transistor load lines, power amplifiers, phase inverters, complementary symmetry.

ELTC 104 ELECTRONICS (3)

Electrical measurements; induction; capacitance; A.-C. theory; reactance; capacitive reactance, impedance, resonance, transformers; various construction projects.

ELTC 130 ELECTRONIC THEORY (8)

Electronic fundamentals: nature of matter, nature of electricity, direct current circuits, Kirchhoff's Laws, power dissipation, variable resistors, voltage divider circuits, magnetism, D.-C. measuring instruments, the electric motor, induced emf, generating alternating emf, the sine curve, A.-C. characteristics, inductance and inductances, capacitance and capacitors, resonance, time constants, R-F signals, period nonsinusoidal waveforms, thermionic emission, diodes, triodes, pentodes, special tubes, tube ratings, power supplies, maintenance problems, audio amplification, audio frequency circuits, transistor principles, cascaded amplifiers, power amplifiers, R-F oscillators, silicon transistors, metallic rectifiers.

ELTC 131 DOMESTIC EQUIPMENT LAB (7)

Adjustment, maintenance, servicing, and installation of domestic equipment including: record changers, tape recorders, stereo and P.A. amplifiers, A.M., F.M. and multiplex, TV, color TV, solid state equipment.

ELTC 200 TRANSISTOR AND PULSE CIRCUITS (5)

Transistor theory, parameters, transducer gain, collector efficiencies, quantitative analysis of small signal amplifiers, graphic analysis of power amplifiers, stabilization techniques, transistor switching characteristics, types of semi - conductor devices, wave shaping circuits, multivibrators, saw tooth generators.

ELTC 201 COMPUTER SYSTEMS (4)

Computer arithmetic, computer logic circuits, Boolean algebra, adders and subtractors, computer memories, system operation, control units, peripheral input-output devices.

ELTC 202 COMMUNICATION SYSTEMS (3)

Transmitting tubes, power supplies, amplifiers, oscillators, amplitude modulation, mathematical analysis of the A.M. signal, A.M. transmitters, A.M. receivers, single sidebank, theory of frequency modulation, frequency swing, bandwidth, stability, deviation ratio, modulation index, Bessel tables, audio correction circuits, direct F.M. transmitters, capacitive microphone modulator, reactance tube modulators, typical direct F.M. transmitters, phase modulation, theory and analysis, phase modulators, typical F.M. transmitters and F.M. receivers.

ELTC 203 MICROWAVE SYSTEMS (3)

Microwave propagation theory, waveguide hardware, methods of energizing waveguides, waveguide components, microwave tubes, microwave duplexers, measurement techniques, transmission lines, types of lines and characteristic impedance calculations. Smith charts: theory, normalized impedances and admittances, sending and impedance, load impedance, radar range equation, determination of ranges, a zimuth and elevation, minimum range and range resolution, types of scanning, types of displays, single-ended mixers, magic tee balanced mixers, hybrid ring duplexers, monopulse radar duplexers, pulse modulators tuning units, calibration circuits, tuning and operation, F.M. and Doppler radar, M.T.I. radar and monopulse radar.

ELTC 204 RADIO-TELEPHONE (1)

Circuits and circuitry, the output stage and loudspeakers, the antenna and input stage, the power supply, the direction finder, block diagram, principal, care and maintenance, operation, the echo sounder, principal, block diagram, care maintenance and operation. The radio telephone, block diagram, care, usage and maintenance, requirements for a radio telephone licence. **Laboratory:** Projects shall include the crystal radio set, the simple superheterodyne receiver, the simple two tube receiver, circuitry and power control. (One semester)

ELTC 205 NAVIGATION EQUIPMENT (1)

The Gyro Compass, operation use and maintenance. Radar, its operation, use and maintenance, advantages and disadvantages relative and true motion displays, exercises in navigation and plotting on the radar similator. The decca navigator, principles of operation and operation and use of equipment and charts. Loran, usage and use of Loran charts, principles. General subject review.

ELTC 211 ELECTRONIC DESIGN (2)

Design factors and tasks, space planning, panel mounting racks, types of equipment. Modular design. Other design elements, design techniques, specifications and standards.

ELTC 212 ELECTRONIC LAB (2)

Construction and testing of amplifiers, power supplies, A.M.-F.M. receivers and transmitter components; transistors and printed circuits.

ELTC 213 MATERIALS AND PROCESSES (2)

Conductors and insulators, resistors, capacitators and methods of production. Tolerances, electronic and physical; vacuum tubes, transistors and etc. Types of materials and uses, specifications.

ENGINEERING

Note: Courses in this group are applied towards a diploma in Marine Engineering.

EN 101 ENGINEERING PRACTICE (2)

Fundamentals of boilers, mountings, furnaces, draft, fans, fuel systems.

EN 103 APPLIED HEAT (1)

Thermometry, heat units, specific heat, heat equivalents, transfer, laws of thermodynamics, energy.

EN 104 APPLIED HEAT (1)

Boyle's and Charle's Laws, Universal Gas Laws, gas constants, expansion and compression, specific heats of gasses.

EN 105 APPLIED MECHANICS (1)

Mass, force, weight, scolar and vector quantities, British and Metric systems. Resultant and equivalent of forces: forces, resolution, triangle of, parallelogram of, moments, couples, levers, graphics.

EN 106 APPLIED MECHANICS (1)

Friction: Laws of friction, angle of friction, coefficient of friction. Machines: load, effort, mechanical advantage, velocity ratio, efficiency. Simple machines: lever, inclined plane, wheel and axle. Density: relative density and specific gravity. Flobation and law of Archimedes: simple examples. Fluid pressure: pressure due to head and density, atmospheric pressure, the simple barometer, monometers, pressure gauge, hydraulic press.

EN 107 STRENGTH OF MATERIALS (1)

Physical properties of materials, material testing, tensile, torsion and shear tests, interpretation of results. Proof stress, Young's Modulus of Elasticity, percent elongation, percent reduction of area, breaking stress, factor of safety.

EN 109 METALLURGY (2)

Materials used in boilers and engines, metals, sources, production methods, treatment; iron and steel, types, alloys, strength and composition, testing.

EN 110 METALLURGY (3)

Non-ferrous metals, sources, properties, treatments; alloys, properties, composition, testing.

EN 111 SHIP CONSTRUCTION (1)

Forces acting on ship, construction details, materials, shafts and propellers, dry docking, bilge and ballast.

EN 201 ENGINEERING PRACTICE (2)

Fundamentals and theory of reciprocating engines, turbines, condensers, reduction gears, thrust blocks, shafting, propellers.

EN 202 ENGINEERING PRACTICE (2)

Principles of auxiliaries: reciprocating, turbo, motors, driven units, generators, fans, blowers; piping systems, I.C. engines.

EN 203 THERMODYNAMICS (2)

Combustion: chemistry of combustion. Gravimetric and volumetric analysis. Stiochiometric quantity of air. Products of combustion by weight and by volume. Calorific value of a fuel — theoretical estimating, actual determination by calorimeter. Isothermal and Adiabatic operations. $PV^n = C$. Problems involving use of gas laws. Work diagrams. Air compressors — types and operating procedure. Index of compression.

EN 204 THERMODYNAMICS (2)

Properties of steam — wet, dry saturated and superheated. Relationship between pressure and temperature. Use of steam tables. Steam generators — shell and water tube boilers. Steam plant. Boiler thermal efficiency — equivalent evaporation. Methods of testing boiler performance. Orsat apparatus. Steam engines — simple and compound reciprocating engines. Theoretical engine diagram. Diagram factor. Determination of horsepower.

EN 205 APPLIED MECHANICS (1)

Triangle of forces and converse: simple framed structures, Polygon of forces, principle of moments applied to beam reactions and centre of gravity, etc., done graphically. Friction on the inclined to plain: work and power on the inclined plane, graphical representation of work. Stress, strain, Young's modulus, facor of safety and ultimate stress.

EN 206 APPLIED MECHANICS (1)

Compound wheel and axle, western pulley block, screw jack, worm and wheel, wheel table and belt drives, law of machines. Velocity and acceleration, distance-time graphs, equations of motion, motion due to gravity, angular motion. Energy, potential and kinetic energy, Newton's Laws of Motion, momentum and rate of change of momentum, centrifugal force, motion in a curve, simple governors.

EN 207 STRENGTH OF MATERIALS (1)

Stress in their shells. Circumferential and longitudinal stress. Theory of bending, bending moment and shear force diagrams. Combined point and distributed loading. $\frac{M}{I} = \frac{f}{v} = \frac{E.}{R.}$ .Stress due to bending. Moment of inertia for various sections. Torque and torsion. Stresses due to torsion $\frac{T}{J} = \frac{OX}{L} = \frac{f.\,J}{r}$ for various sections. HP transmitted. Solid and hollow shafts.

EN 208 STRENGTH OF MATERIALS (1)

Prerequisite: EN 207.

EN 210 MECHANICS OF FLUIDS (1)

Density of fluids, liquid and gaseous. Hydrometers, specific gravity, salinometer. Pressure of the atmosphere, barometer, effect of altitude, pressure gauges, manometers. Compressibility of air, air pump. Pressure of submerged surfaces of regular shape. Fluid flow, steamline, laminar and turbulent. Energy in a fluid, Bernoullis Theorem. Pressure energy, kinetic energy and potential energy. Effect of friction. Flow through an orifice. CV, Cc, Cd.

EN 301 ENGINEERING PRACTICE (2)

Principles of machinery: steering gear, capstans, winches, evaporators, refrigeration, air compressors, air conditioning, pumping, flooding, fire-fighting.

EN 302 ENGINEERING PRACTICE (2)

Fundamentals of internal combustion engines, gas turbines, for propulsion and auxiliaries.

EN 303 THERMODYNAMICS (2)

Steam Turbines: impulse, reaction, velocity diagrams for steam turbines. Thermal efficiency, internal combustion engines, theoretical and actual engine cycles: Carnot, Otto, Joule and Diesel. Air standard or relative efficiency. Determination of temperatures, pressures and volumes at state points of cycle. I.h.p., B.h.p., and Mechanical efficiency; Morse Test on Spark ignition engines.

EN 304 THERMODYNAMICS (2)

Rankine cycle for steam plant. Overall efficiency — steam plant trials. Engine testing. The gas turbine — applications to marine engineering. Refrigeration — types of systems, refrigerant performance, heat pump cycles. Revisionary examples on above.

EN 305 THEORY OF MACHINES (2)

Vectors, force and motion, gravity, moments, couples, dynamics of simple engine mechanisms, centrifugal force. Simple harmonic motion, simple and compound pendulum. Friction: limiting angle, inclined plane, efficiency. Belt drives: tension H.P.

EN 306 THEORY OF MACHINES (2)

Velocity diagrams: acceleration diagrams, gears, slide valve, piston and load, flywheels. Balancing: dynamic, primary, imbalance. Governors, cams, steering gear. Vibration, whirling shafts, transverse and torsional oscillation.

EN 307 MECHANICS OF FLUIDS (1)

Venturi and Orifice meters. Flowmeters. Force in a jet. Notches and Weirs. Friction in pipes — hydraulic gradient — syphon. Flow in open channels. Corresponding speed of a model. Viscosity — visco static resistance.

EN 308 MECHANICS OF FLUIDS (2)

Pumps. Types and application. Frictional head. Total head. Volumetric efficiency. Slip. Cavitation. Simplex, duplex and three throw ram. Air vessels. Rotary displacement pumps. Centrifugal and turbine pumps — balancing. Calculation of speed for head required. Characteristics of pumps. Water turbines — centrifugal and axial flow types. Characteristics. Fans — centrifugal and axial flow types. Characteristics.

EN 309 STRENGTH OF MATERIALS (1)

Stresses in thin rotating rims due to centrifugal forces. Graphic statics. Simple frame structures. Determination of tensile or compressive loading. Forces in members.

EN 311 NAVAL ARCHITECTURE (1)

Types of ships, measurement and classification, terminology. Rules of Classification.

EN 312 NAVAL ARCHITECTURE (1)

Stability, strength of ship, resistance and propulsion, stability and coefficients.

ENGLISH

ENG 10 ENGLISH (½)

Vocabulary of the trade: spelling, pronunciation and definition of trade terms. Classification of words: parts of speech, function of each part of speech. Use of words: qualities of a good sentence, unity, correctness, order of words, spelling and punctuation, diction and sound. Kinds of sentences: simple, compound, complex. Improving sentences: recognition and correction of common error.

ENG 11 ENGLISH (2)

More intensive coverage of materials in ENG 10.

ENG 20 ENGLISH (½)

Expressing ideas (the paragraph): qualities of a good paragraph, unity, coherence, topic sentence, contrast, correctness, paragraphs an general description, paragraphs on technical description, tools, equipment, processes, oral and written exercises, usually followed by discussion. Vocabulary of the trade: spelling, pronunciation and definition of trade terms.

ENG 21 ENGLISH (2)

ENG 30 ENGLISH (½)

Analysis and precis writing: passages from trade texts, journals, periodicals and specifications. Descriptive writing: the writing of short technical descriptions of tools and processes (sketch and describe). Technical writing: instruction and practice in the planning and writing of technical reports, reports on accidents, defective parts or appliances, complete job analysis and estimates. Speech: preparation, development and delivery of short speeches or lecturettes.

ENG 100 LANGUAGE AND COMMUNICATION (2)

Grammar, a review of English grammar to cover basic grammatical and compositional forms. Composition: common errors in sentence structure, sentence logic, the paragraph, analysis and development, paragraph logic, planning, the essay, essay planning and organization, basic rules of bibliography, format. Introduction to business writing, study of sample letters. Book review: based on the reading of four books in the field of the novel, the essay, other non-fictional forms. Public speaking: oral presentation in class. Library research: a survey of the resources of the library with emphasis on the reference library. Human relations in industry: seminars with industrial representatives.

ENG 101 ORAL AND WRITTEN COMMUNICATION (2)

The development of clear, concise, well-organized communication with specific application to technical writing and oral presentations. Contemporary ideas: a study of modern literature and current issues.

ENG 109 ENGLISH (2)

A study of coherent, effective writing, the importance of proper work usage, good and bad practices, grammar, the importance of phraseology, the dictionary, the importance of proper spelling and pronunciation. Reading habits.

ENG 121 ENGLISH (1)

Note taking, lecturettes, explanations, letters, instructions, report writing, essay and precis, topical subjects. (One semester)

ENG 122 ENGLISH (1)

English composition: review of grammar and composition; library research; the precis; the essay; study of fiction and non-fiction. (One semester)

ENG 123 LANGUAGE AND COMMUNICATION (1)

Oral and written business communications: Effective and precise speech. Composition: preparation and delivery of formal and informal speeches, lectures and technical subjects. Conduct of meetings. Effective listening. Technical research report writing. Precise and effective business letters; avoïdance of jargon. (One semester)

ENG 130 LANGUAGE AND COMMUNICATION (2)

Understanding words: use of dictionary, building words, signs and slogans, choice of words. Sentence structure: qualities of good sentence, expression of complete ideas. Paragraph structure: logic clarity, relevance, progression of ideas. Communication; precis writing, reading for comprehension, the technical report, business correspondence, oral presentation of personal research. Understanding English‘ a survey of library resources, how to use a reference library, English as the key to understanding human relations and social values.

Note: Students with English Electives take either 131 or 132 and elect either 133 or 134 in their second semester.

ENG 131 IMPROVEMENT IN READING AND STUDYING (1)

The following skills will be developed: Reading for comprehension, reading for details, reading for main ideas, skimming for information, summarizing information, making notes.

ENG 132 ENGLISH FOR NEW CANADIANS (1)

The emphasis in the course will be on oral and written work in English which attempts to overcome the problems faced by students whose native language is not English. Grammatical structure will be emphasized, plus assignments to develop confidence and speed in speech, writing, and reading.

ENG 133 READING FOR ENJOYMENT (1)

Assistance will be given by the instructor to individual students in choice of books, both fiction and non-fiction, which might make reading an enjoyable and worthwhile subject. Books will be discussed frequently in small groups. Some informal written and oral assignments will be given in response to reading. (Not book reports)

ENG 134 ORAL AND WRITTEN EXPRESSION —REMEDIAL AND DEVELOPMENTAL (1)

Topics for discussion and writing will stress the interests of students, with the aim that students may bring to their efforts in speech and writing sufficient motivation to develop effective structure and style. Remedial work in language and spelling will be included as required. Specific orientation will tend toward technical writing.

ENG 141 LANGUAGE AND COMMUNICATION (1)

Understanding words: use of dictionary, building words, signs and slogans, choice of words. Sentence structure: qualities of good sentence, expression of complete ideas. Paragraph structure: logic, clarity, relevance, progression of ideas. Communication: precis writing, reading for comprehension, the technical report, business correspondence, oral presentation. (One semester)

ENG 200 LANGUAGE AND COMMUNICATION (2)

Grammar: a programed study of English grammar, home assignments and short class discussions. Composition: the preparation and delivery of formal speeches and lectures on technical subjects, technical research report writing, philosophy of good business writing, study of basic library tools used in research, organizing a report, format, basic parliamentary procedure. Supplementary reading: the reading of four books from a selective list, written or oral book reports, human relations in industry, seminars with industrial representatives.

ENG 201 HISTORY OF IDEAS IN WESTERN CIVILIZATION (2)

This course aims, first, at allowing the student to examine the history of ideas in Western Civilization. In order to contribute to his society more fully, the prospective graduate of the technician program should be competent not only in his chosen vocational field, but also in the appreciation of the attitudes, values and ideals of his society. (One semester)

ENG 202 TECHNICAL REPORT WRITING (2)

The organization and preparation of technical reports used in business and industry with emphasis on the formal technical report in the student's own field. (One semester)

ENG 203 SPEECH (2)

Practice in the preparation and delivery of various types of speech with emphasis on the presentation of factual material using audio-visual aids. (One semester)

ENG 204 INTRODUCTION TO DRAMA (2)

Study and experience in the art of drama as a means of creative self-expression. This will include a study of aspects of acting such as characterization and voice projection, the analysis of plays, and elementary stagecraft. The main emphasis will be on participation in acting, directing, and development of backstage skills, encouraging the student to discover and develop his own talents. (One semester)

ENG 205 PERSPECTIVES ON MAN AND SOCIETY (2)

A study of 20th century literature specifically chosen to develop understanding and insight into present-day society. Emphasis will be placed on free discussion in order to encourage students to develop their own opinions. Writing assignments will aim for original reactions to material studied. (One semester)

ENG 206 THE FILM (2)

Use of the film as an interpreter of ideas and as a conveyor of information. Study of elements of film-making including script writing and editing, picture taking and editing, directing and producing. Direct application to a relevant topic or course. (One semester)

ENG 207 LANGUAGE AND COMMUNICATION (2)

Effective writing, how to correlate information and the compilation of reports in relation to shipboard usage, organization, operation, damage pertaining to marine practices, cargo, fuel, etc. Log book entries, common legal terms in relation to shipping forms, preparation of individual reports covering incidents (accidents, damage, stranding, etc.). Effect letter writing. Oral presentations.

ENG 210 COMMUNICATION (1)

A study of the different aspects of report writing and business correspondence. The study will include the effective expression of ideas, the psychology of communications, and the conduct of business meetings. (One semester)

ENG 211 COMMUNICATION (2)

A study of the different aspects of report writing and business correspondence. The study will include the effective expression of ideas, the psychology of communications, and the conduct of business meetings.

ENG 401 LANGUAGE AND COMMUNICATION (1)

Essay composition, log book details and wording of entries, a study of individual reports to company offices, preparation of material lists, legal terms used in marine practices, reports to government agencies.

FOOD SERVICE

FOOD 100 INTRODUCTION TO FOOD SERVICE (1)

General orientation and introduction to the industry: orientation of the student into the school and the department, the policies and curriculum of the department, school rules and regulations, services, S.A.C. Introduction to the food service industry, its background, scope and magnitude. (One semester)

FOOD 101 QUANTITY FOOD PRODUCTION I (5)

Menu planning, kitchen and stores control, buying procedures, time and motion studies, equipment maintenance, work planning, provincial health regulations, storage of food, sanitation responsibilities, food handling rules and methods, dishwashing procedures, cleaning schedules, building requirements. (One semester)

FOOD 102 FOOD PRODUCTS AND STANDARDS (2)

Food products and standards: complete coverage of food products from A-Z, quality indications, availability, grades, standards, sizes, marketing methods, standard containers, convenience foods. (One semester)

FOOD 103 MERCHANDISING (2)

Food service merchandising theory: menu merchandising, development of "theme" in food service area, types of food service, establishment of customer-employee contact standards, obtaining public recognition and good will, methods of advertising and promotion. (One semester)

FOOD 110 FOOD SERVICE INDUSTRY (1)

Types of food service establishments and their organization. Departmental functions in various food service establishments. Challenge of work in food service industry and job opportunities available. Field trips to food processing plants and manufacturers, guest speakers from the industry.

FOOD 111 QUANTITY FOOD PRODUCTION II (5)

FOOD 113 ACCOUNTING AND COST CONTROL (2)

Production cost control and cost accounting: Methods of controlling food, labour, and general expenses, food service operating accounting systems. (One semester)

FOOD 114 EXEMPLARY SUPERVISORY ACTION (1)

Exemplary supervisory action: attitudes toward customers and staff rules of etiquette, manners and dress, personal hygiene, sanitary food and equipment handling, safety, preventive maintenance of equipment.

FOOD 115 CATERING AND SERVICING (1)

Catering and the serving of food: Students will learn table setting and table service in the school's dining room, and they will cook for, set up, and serve several large banquets during the periods set aside for this subject.

FOOD 140 MEAT-CUTTING THEORY (5)

Sanitation and hygiene, accident prevention, introduction and proper usage of all personal and electrical equipment found in a meat department, types of refrigeration — meat counter and walk-in box, F.I.F.O. method, care, handling, receiving and holding of all meat, care, handling, receiving and holding of all smoked meats and cooked variety meats, types of meat packaging, Food and Drug Act and Weights and Measures Act. (One semester)

FOOD 141 MEAT-CUTTING PRACTICE (5)

The proper cutting and displaying of beef, pork, lamb and veal both for retail purposes and self-service stores, cutting tests, pricing retail meat cuts, figuring percentage of profit, operating expenses, and how to use merchandising aids. (One semester)

FOOD 142 DINING ROOM SERVICE (10)

The food industry as a career, personal appearance, development of personality, expectations of the employer, tourist information, profit and loss, food service outlets, history of menus and menu construction, menu terminology, American, Russian and French service, condiments and sauces, sidework, tray handling, table setups, cheque book and sales tax, service to the blind and the child, meats, seafood, fish, poultry, game, vegetables, salads, desserts, spirits, wines, cocktails, how to serve, suggestive selling, conduct on duty, co-operation with fellow workers, applying for a position, banquet planning, set-up and service. (One semester)

FOOD 143 THEORY OF FOOD (5)

Sanitation and hygiene, safety, equipment, refrigeration, purchasing, menu planning, culinary terminologoy, receiving, storage, and issuing, portion control and costing. (One semester)

FOOD 144 KITCHEN PRACTICE AND FOODS LABORATORY (2)

Basic flavouring, herbs and spices, basic stock and sauces, soups, eggs, pasta and rice dishes, fish and seafood, basic preparations of meat, poultry and game, garnishes, potato and vegetable cookery. (One semester)

FOOD 145 FOODS LABORATORY (2)

Larder and cold preparations: butchering, salads, dressings. Bakery: basic preparations in the patisserie, quick breads, yeast leavened doughs, pies, tarts, cookies, puddings, ices, petit fours, fresh fruit desserts, cake decorations. (One semester)

FOOD 211 QUANTITY FOOD PRODUCTION 111 (4)

FOOD 213 ACCOUNTING (1)

General accounting for the industry: bookkeeping and accounting methods as used in food service operations.

FOOD 214 SUPERVISION I (4)

Food service operation supervision: circulation of students through the food service facilities of the school (kitchen, bakery, dish-room, cafeteria counter and cash register, dining room, store room, etc.) to assume various supervisory positions.

FOOD 215 CATERING AND SERVICING (1)

FOOD 220 MANAGEMENT (2)

Management of food service operations: personnel relations, staff training, job descriptions, production scheduling, labour legislation. Law pertaining to food service operations. Design of food service facilities. Methods of supervision and control over all aspects of food service operations.

FOOD 221 FOOD SCIENCE LAB (2)

Food science laboratory: detailed study of cooking methods, effect of various cooking media on foods, development of new recipes and new products, nutrition and diets, convenience foods.

FOOD 223 ACCOUNTING (1)

Purpose, rules, terms used, daily, monthly, record sheets, wage and petty cash records, cheques, statements, other records, profit and loss sheets, expenditures, summaries, operation of cash registers, handling money, introduction to cost control, business percentages, formula costing.

FOOD 224 SUPERVISION 11 (6)

HAIRDRESSING

HAIR 10 THEORY OF HAIRDRESSING (6)

Ethics, history of hairdressing, hygiene, personality, sterilization and sanitation of equipment, anatomy and physiology, diseases of the skin, scalp and hair, use of electrical appliances in hairdressing, facial treatment, make up, shampoos and rinses, hair tinting and bleaching, scalp treatment, hair cutting, finger waving, permanent waving, hair styling, manicuring, chemistry of materials.

HAIR 11 HAIRDRESSING PRACTICE (6)

Basic techniques concerning all phases of the trade are performed upon live models with emphasis on proper and safe working habits. Development of skills necessary to apply the principles outlined above. Personal development of students: poise, deportment, weight control, correction of standing, sitting and walking posture.

HEATING

HT 100 DOMESTIC OIL BURNERS (2)

Types of domestic burners, parts of burners, filters, purpose of controls, nozzles, fuel line problem, draft, safety precautions, public relations, procedures for annual conditioning.

HT 101 OIL BURNER (3)

Theory of combustion, fuel units, transformers, storage, controls, circuitry, heating systems, service procedures, regulations and public relations.

HT 110 HEATING SYSTEMS (3)

Design and lay-out of plans for warm air heating and air conditioning systems. Calculating heat loss and heat gain.

HT 111 HEATING SYSTEMS (2)

Design and lay-out of plans for hot water, steam, electric heating and air conditioning.

HT 112 COMMERCIAL OIL AND GAS BURNERS (1)

Type of commercial oil and gas burners, oil tank installations, preheaters and accessories, gas piping and venting for commercial gas burners, combination oil and gas unit, types of boilers and boiler conversions, firing sequence, flame failure protection, combustion control, logic diagrams, schematic wiring diagrams, commercial hot water units, make-up air units, energy code requirements.

HT 141 DOMESTIC GAS-FIRED EQUIPMENT (1)

Gas piping, fundamentals of gas venting, fundamentals of combustion, the atmospheric burner, gas pressure regulator, principle of the thermocouple, general requirements for gas appliances, gas-fired hot water heater, conversion burners and design units, installation, wiring, controls, energy code requirements.

INDUSTRIAL PROCESSES

IND 100 MATERIALS OF CONSTRUCTION AND DESIGN I (4)

Symbols, line designation, equipment designations, steam piping, flow calculation, properties of pipe, pipe and fittings (ASTM, ASA) traps, valves orifice flanges, chemical and physical properties of alloys, fluid piping and systems, flow, horsepower, dimensions of fittings, oil piping, flow formula, viscosity, fittings, gas, air and instrument piping, compression, oxygen, ammonia, freeon, instrumentation, flow diagrams, plot plans and other design procedures.

IND 101 BUILDING CONSTRUCTION (3)

Reinforced concrete, structural steel, timber, stone mechanical installations, construction equipment and organization, construction methods for various types of construction, interpretation of working drawings, plans sections, elevations and details, quantity surveying.

IND 200 MATERIALS OF CONSTRUCTION AND DESIGN II (4)

Alloy piping, metals and alloys employed in the conveying of corrosives: temperature, concentration, velocity, shock frequency of use, equipment design. Mechanical properties of stainless steel ni-resistant, nickel, monel, aluminum, lead, copper, etc. Plastic piping materials, corrosion resisting, non-contaminating materials; physical standards, properties and uses, plastic lined steel pipes, hard rubber and other synthetics, insulation, hangers and supports, gravity flow and drain piping, miscellaneous piping materials and design. Piping codes: interpretation, in relation to pressure and temperature for oil, gas, steam.

INSTRUMENTATION

INST 100 MEASURING PRINCIPLES I (3)

Review of basic principles, pressure gauges, liquid and gas measurement, liquid level measurement, temperature measurement (non-electrical), humidity measurement, specific gravity, viscosity.

INST 101 MEASURING PRINCIPLES II (3)

Review of fundamentals, electrical pressure transducers, electrical flow devices, electrical level transmitters, electrical temperature transducers, potentiometric devices, indicating, recording and registering equipment, analytical instruments, radiation-type transducers, humidity-measuring devices.

INST 102 CONTROL PRINCIPLES AND TELEMETRY (3)

What constitutes a process, process characteristics — static and kinetic, responses of components and systems, energy characteristics of the process, the block diagram, feedback control systems — open and closed loop, pneumatic and hydraulic controllers and final operators.

INST 103 PIPING AND INSTRUMENT LAB (2)

Instruction and shop practice in pipe fittings, valves, hand tools, threading, flaring, bending, soft soldering, silver soldering, protection equipment.

INST 130 PNEUMATIC INSTRUMENTATION (7)

Applied physics, pressure, level, flow, temperature measuring and transmitting instruments, humidity control, final control elements, controllers.

INST 131 ELECTRONIC INSTRUMENTATION (7)

D.-C. fundamentals, A.-C. fundamentals, electronic pressure, level, flow, temperature, speed measuring and transmitting instruments, electronic controllers and final control elements, pH, spectrometry, chromotography fundamentals of digital and analog computers, electrical wiring techniques for control applications.

INST 132 INSTALLATION TECHNIQUES (1)

Hand valves, threading, silver and soft soldering safety valves, steam traps, lubrication techniques, gasket materials, tubing techniques: flaring, bending, fitting, etc. Fabrication and installation of control loop piping and tubing.

INST 200 INSTRUMENTATION TECHNIQUES (3)

Overhauling and process tuning of controllers and final control elements under production conditions, advanced techniques using simulators.

INST 201 CONTROL SYSTEMS ANALYSIS (3)

Control of D.-C. electrical energy to resitive loads, transistor amplifier, silicon controlled rectifiers, magnetic amplifiers and saturable core reactors, electrical generators, amplidyne, thyratron control, ignitron control relays, magnetic and other logic control systems, solid state devices, frequency response of components, feed-back control, controllers and their responses.

INST 202 ANALYTICAL PROCESS INSTRUMENTATION (2)

Process analyzers discussed in detail, combustion, moisture, gas chromotography, ultraviolet and infrared analyzers, pH conductivity and oxidation reduction.

INST 203 COMPUTER PRINCIPLES AND SYSTEMS (2)

Historical development of computing systems, fundamentals of analog computers, application of analog computers, basic principles of digital computers — computer elements, input-output devices and data conversion, registers, theory of programming computers, application of process and numerical control.

IRONWORKER

IRON 10 IRONWORKER I (5)

Safety regulations, types of tools used, installation of rod work in footings, floor slabs, beams, columns, walls, piers and stairways, stacking and care of material on the site. Setting of base plates, care and use of mobile land rigs, cranes, guy derricks, stiff leg derricks, methods and procedures for performing the functions of hooking-on, tagging, signalling, connecting, fitting, bolting, use of power-activated tools. Tying knots and making bowline hitches, clovehitch, timber hitch, scaffold hitch, barrel hitch, half hitch and rolling hitch. Correct use of chokers, spreaders, hooks and guy lines.

Ornamental ironwork and curtainwall installation, use of resin base, polysulphide base, mastic base and polybutane base sealants, methods for installing extruder aluminum frames, side jambs, sash, division and corner bars.

IRON 20 IRONWORKER II (5)

Methods of post tensioning, cutting, bending and fabricating steel bars for columns, beams, floor slabs, and stirrups, detailed knowledge of bend allowances and bar lists. Procedures and methods for drilling, reaming, burning, cutting, assembling and marking steel members, procedures for riveting, plumbing, aligning and shimming. Use of splicing tools, splicing fibre rope by short splicing, long splicing, crown and back splicing, eye splicing, erecting scaffolding, falsework, use of gin poles, high lines, and tuggers. Knowledge of the care and handling of aluminum, brass, bronze, stainless steel and other forms of ferrous and non-ferrous building trim.

IRON 30 IRONWORKER III (5)

Methods of handling precast and pre-stressed members, hoisting and placing precast columns, beams, roof and floor slabs, facia panels and wall panels. Splicing wire rope by short splicing, long splicing and eye splicing, breaking strains and working strengths of hoisting cables, reaving drums and sheaves. Knowledge of the layout methods for doors, frames, gratings and grills, hand rails, stairways, platforms, and miscellaneous ironwork.

Familiarization with plans and specifications establishing lines and levels, setting anchors, assembling and installing curtain wall components, levelling, aligning, securing and installing adapters, flashing and sealants.

JEWELLERY

JWL 160 INTRODUCTION TO JEWELLERY (4)

Branches of the industry: the jewellery craftsman, engraver, diamond and gem stone setter, silversmith. Weights and measures, polishing and plating, collection and reclaiming precious metals, sweepings. Theory of metals and materials: metals in the jewellery industry, testing metals, Canadian Precious Metals Marketing Act, chemicals, hints and recipes. Theory of gemology: optical and physical properties of gem stones, gem testing, special gemology, gem stones and limitations. Applied designing and modelling: aesthetics related to jewellery design, development of designs for jewellery modelling in plasticene.

JWL 161 JEWELLERY MAKING I (10)

Introduction to jewellery, history of jewellery making, tools, planishing, annealing, piercing, filing, rolling, drawing, making tubing, hard soldering, finishing and polishing metals, shaping, forming, settings, making rings, casting in cuttlefish and sand, hand-made rings, cufflinks, earrings, brooches, pendants.

JWL 162 DIAMOND SETTINGS I (10)

History of jewellery making and setting, planishing, annealing, piercing, filing, rolling, drawing, making tubing, hard soldering finishing, polishing, preparation of gravers, casting in sand and cuttlefish, centrifugal casting, hardening and tempering steel, making gravers, beading tools, properties of metal, drilling, setting stones, stone pushers and punches, retipping claws, burnishing tools, setting melee, ornamental settings, fancy shaped diamonds.

JWL 163 ENGRAVING 1 (10)

Tools, care and use of equipment, cutting, rolling, annealing, planishing, sawing, filing, drilling, piercing, making engravers' plates, assembly and preparation of gravers, drawing on metal, cutting lines and circles, burnishing, hardening and tempering of steel, monograms, basic heraldry, simple crests and coats of arms, all types of lettering, transferring designs, ornamental engraving, layout, wriggling and wide cuts, use of the engraving block, engraving on inside of rings, raised letters and designs, making steel punches, restoring and polishing, inscriptions, engraving on stainless steel, use of oval graver, machine engraving, pantograph principles, cutters and grinding machine, making templates, price calculation for engraving.

JWL 260 THEORY (4)

Similar to 160 JWL at an advanced level.

JWL 261 JEWELLERY MAKING II (15)

Similar to JWL 161 but at an advanced level and including production cast rings, bracelets, centrifugal casting for production, repair of jewellery, hand-made watch cases and bracelets, electro-plating.

JWL 262 DIAMOND SETTING II (15)

Similar to JWL 162 but at an advanced level.

JWL 263 ENGRAVING II (15)

Similar to JWL 163 but at an advanced level.

LATHING

LATH 10 LATHING I (6)

Job conduct, responsibilities, trade materials, uses, precautions, and products. Tools of trade, care and uses. Bench work routines, theory and techniques for erection of partitions, pilasters, corner beads. Elementary geometry and drawings related to projects. Estimating gypsum board materials.

LATH 20 LATHING II (6)

Drawings and erection of flat and beamed ceilings, niches, arches, geometry related to projects. Estimating for metal lathe ceiling projects. Drawings for projects.

LATH 30 LATHING III (6)

Geometry, drawings and layout for groin and dome ceiling projects. Job programming from view point of mechanic and foreman. Consideration for accoustal system, materials, erection systems and values.

MACHINE SHOP

MACH 110 WORKSHOP TECHNOLOGY (1)

The care and use of hand tools for metal removal, marking out and measuring, introduction to and operation of the lathe, shaper, milling machine, use of precision measuring instruments, heat treatment, hardening and grinding machines, projects involving benchwork, drilling, turning, milling and shaping.

MACH 120 BENCHWORK (1)

Hand tools: filing, chiselling, tapping, basic hand fitting. Layout: application of various precision tools. Drillings: operation of various drill presses and radial drills, safety drilling, reaming, boring, counterboring, countersinking, automatic tapping, speeds and feeds, drill grinding, work holding devices. Bandsaw and filing machines: operation of various machines, safety welding saw blades, selection of blades, internal and external sawing and filing, angular sawing and filing, contour sawing, speeds and feeds, base welding, gas and arc; safety, welding theory, basic application welding rods, cutting attachments.

MACH 121 LATHEWORK (3)

Types: principal parts, safety and operation, work holding attachments, grinding lathe tools, lathe grinding, drilling, reaming, parallel turning, taper turning, boring, threading, spring winding, eccentrics speeds and feeds, theory of various threads forms such as Unified, Acme, change gears.

MACH 122 MILLING AND SHAPING (2)

Types of mills: universal, horizontal, vertical, ram turret, vertical, jig bore. Mills: principal parts, safety, operation, methods of holding work attachments, speeds and feeds, types of cutters, cutting compounds. Indexing: direct, plain, angular, differential, gear theory, gear cutting, drilling, milling, fly cutting boring. Types of shaping: shaping, planing, slotting. Shaping machines: principal parts, machine theory, safety, operation cutting flat surfaces, angles, radii, keyways, methods of holding work, grinding tool bits.

MACH 123 GRINDING (1)

Safety: types of grinders, types of grinding, grinding wheels; purpose, types, identification, selection, speeds, care and dressing of wheels. Surface grinder: machine construction and operation, manual and hydraulic types, principles of magnetic chuck and demagnetizer, methods of holding work, balancing wheels. Cylindrical grinder: machine construction and operation, parallel, taper and external grinding, checking tapers.

MACH 124 MACHINE SHOP (2)

Fitting: filing, chipping, saving, scraping, marking off, drilling, grinding. Introduction to lathe, parallel work, shouldering, parting, sharpening of lathe tools and drills, centre work. Theory. (One semester)

MACH 125 MACHINE SHOP (2)

Screw cutting, chasing (flat surfaces), production of U.N.F., metric and special threads. Shaping machine, grinding, eccentrism and cranks, theory. (One semester)

MACH 130 WORKSHOP TECHNOLOGY (2)

Machining practices: milling, turning, boring, shaping, drilling. Marking out: layout for machining operation. Fitting: application of hand tools, bench work.

MACH 137 SMALL TOOLS AND MEASUREMENT (1)

The use and care of hand tools such as files, wrenches and screw pitch gauges. The application and care of precision instruments including micrometers, vernier calipers, gauge blocks, plug and ring gauges and dial indicators.

MACH 138 LATHE AND ANCILLARY EQUIPMENT (5)

Operation and practice on lathes, tracer lathe, turret lathe, tools, set-up turning, lubricants, speeds, carbides.

MACH 140 BENCHWORK (2)

The use and care of hand tools such as hammers, files, hacksaws and scribers, the application and care of precision instruments including micrometers, vernier calipers and indicators. General construction and operation of the drill press and bandsaw, safety precautions, methods of holding work on a drill press, drill sharpening, selecting and welding bandsaw blades, filing band. Basic heat treatment, furnace, quenching.

MACH 141 LATHEWORK (4)

Components, operating and setting-up, safety precautions, plain and taper turning, drilling, boring and threading, sharpening tool bits, tracer lathe, turret lathe.

MACH 142 MILLING AND SHAPING (3)

Milling machine: construction, function and operation of various types of milling machine, workholding, cutters and attachments, speeds and feeds, dividing head, plain rapid and differential indexing, cutting compounds. Shaper: principal parts and operation, machining surfaces and keyways with special attention to methods of holding work, safety precautions.

MACH 143 GRINDING (2)

Surface grinder: construction and operation, mounting wheels, methods of holding work, magnetic chuck, demagnetizing, grinding work square, safety precautions. Cylindrical grinder: principal parts and operation, internal and external grinding, work-holding, sharpening milling cutters, safety precautions.

MACH 144 MACHINE SHOP (2)

Measurement: calipers, micrometer, checking concentricity and alignment, gearing tolerances. Operation of lathe, drill press, band saw hydraulic press. Use and care of drills, dies, taps, reamers, files. Plain and taper turning, boring, threading, drilling, hand reaming and pressing. Identifying and machining common metals.

MACH 201 INDUSTRIAL PROCESSES (2)

Demonstration and application of more complex work on lathe, drilling machine, shaper, grinder and milling machine, speed and feed calculations. Principles of small quantity production, selective assembly, interchangeable manufacturing, functional design, manufacturing design and quality control.

MACH 202 JIG AND FIXTURES (3)

Construction and operation of the following: templates, gap gauges, plug gauges, special gauges, drill jigs, milling fixtures, brazing and welding fixtures.

MACH 203 PRODUCTION TECHNIQUES AND SPECIAL MACHINES (3)

Machine engraving, jig bound, slotting, tracing lathe, tool and cutter grinding, turret lathe, E.D.M., E.C.M., numerical control.

MACH 204 DIEMAKING (1)

Punch press theory and operation, press brake theory and operation, theory, development, construction and operation of the following types of dies: cut-off, trim, pierce, blank, bending, forming, drawing, shaving.

MACH 205 DIEMAKING (1)

Theory, development, construction and operation of the following types of dies: lancing, progressive, coining, embossing, cold forming, bulging, swaging broaching, vacuum forming.

MACH 206 DIEMAKING (1)

Theory, development, construction and operation of the following types of dies: pierce, and blank, assembly, compound, subpress, extruding, curling, side cam, horn, moulds (plastics and the cast).

MACH 221 MACHINE SHOP (2)

Square threads, face plate work, milling and boring in the lathe, use of steadies, saddle boring, fly cutting. Theory.

MACH 222 MACHINE SHOP (2)

Milling and grinding, plain and vertical, slide milling, surface grinding. Heat treatment, hardness testing.

MARINE

MAR 100 SHIP KNOWLEDGE (4)

Ship recognition, ship divisions, tonnage and draft marks, lifeboats, internal communications, fire-fighting, life-saving, rockets, ship maintenance, ropes, wire.

MAR 101 MAGNETISM AND MAGNETIC COMPASS (3)

Laws of magnetism, calculations of forces, terrestrial magnetism, charts, corrections; magnetic compass, construction and use, deviation journals.

MAR 102 CHART PROJECTION (3)

Types of projections, charts, bridge navigation, soundings.

MAR 103 RULES OF THE ROAD (2)

International and Great Lakes rules, conventions, common practices, electronic aids.

MAR 104 COMMUNICATIONS (2)

Systems, Morse code by lamp, flag signals, radio-telephone procedures, radio telegraph.

MAR 105 METEOROLOGY (3)

Atmosphere, temperature, water vapour, clouds, instruments, frontal systems and weather, sea and swell, climate, forecasting and reporting.

MAR 110 SHIP'S BUSINESS (1)

Life at sea: duties and responsibilities of officers and crew, organization, records and correspondence, committees, docking and repairs.

MAR 200 NAVAL ARCHITECTURE (3)

Ship design and construction, hydrostatics and ship stability, dimensions.

MAR 201 SEAMANSHIP (4)

Anchors, steering equipment, watches, lifeboats, fire-fighting, cargo and handling, ropes.

MAR 202 SHIP'S BUSINESS (2)

Routines in receiving cargo, bills, receipts, cargo manifest, log books.

MAR 203 NAVIGATION (4)

Solar system, the earth, the moon, dead reckoning, time systems.

MAR 300 NAVAL ARCHITECTURE (2)

Riveting and welding, strength of materials, ballast, rudders; the dynamics of turning; stability, hydrostatic curves.

MAR 301 SEAMANSHIP (2)

Cargo gear, rigging, derricks, loading and discharging; water tanks; ballast.

MAR 302 TIDAL THEORY (1)

Tidal definitions, causation of tides, the equilibrium theory, gravitational effects of moon and sun, the effect of declination, prediction of tides at principal and secondary ports. Admiralty methods of tidal predication.

MAR 303 NAVIGATION (2)

Marc St. 'Hilaire method of position finding, usage of planets and stars, star identification, latitude by Polaris, prime vertical and meridian altitude positions, position lines, chart work, Decca systems, long-range D.F.

MAR 304 METEOROLOGY (1)

The T.R. revolving storm, weather associated with areas of the world, weather forecasting in connection with marine usages, reporting the weather, coding and decoding, construction of a weather map, interpretation and forecasting in general.

MAR 305 MARINE SOCIOLOGY (1)

A study of Canadian shipping, its growth and effect on the Canadian economy. Modern shipping and the effect it plays on the present day economy. Shipbuilding in Canada, past and present. Functions of agents, longshoremen, pilots, modern terminals, their methods of operation, immigration, their duties and functions, consular facilities abroad, modern public health, its duties, functions and regulations.

MAR 400 NAVAL ARCHITECTURE (2)

Methods of ship construction, drawings and sketches, righting moment, statical dynamic stability, longitudinal stability; trim and loading, dry-docking.

MAR 401 SEAMANSHIP (2)

Operation of a vessel, officers' duties at sea and in port, cargo work with respect to loading and discharging, duties and responsibilities when in dry dock, inspection of gear in dry dock, and undergoing surveys, painting and preservation of metal in the ship, review of general seamanship, manoeuvring in rivers and channels, docking and undocking, communications, Morse code practice, International code, radio-telephone.

MAR 402 TIDAL THEORY (1)

Tidal diagrams used on the equilibrium theory, definition used in the Canadian Tide tables, computation of height of tide at required times, time at which the tide will have reached a required height, effect of height of tide on the visibility of lights, consideration of barometric pressure, the coriolis force effect, subject review.

MAR 403 NAVIGATION (2)

General subject review, position line navigation with correction of bearings compass, relative or W.T., lines of soundings, fixing of positions by complementary angles or similar angles, ranges of lights, luminous and geometric, expansion of the geometric and trigonometric formula used in navigation.

MAR 404 CHART WORK (1)

Review of deviation and gyro error, plotting of courses, simple fix, running fix, effect of current, counteracting current, allowing for current, plotting of radio and celestial position lines, terrestrial position lines, circles of position by distance finding methods, usages of a single position line, general subject review.

MAR 405 MARINE SOCIOLOGY (1)

Relationship between company and officer, officer and Master and fellow officer, handling of labour with respect to crew and organization, maintaining discipline, duties in regard to absence of the Master, delegating authority to junior officers, noting of protests, legal aspects, insurance of vessels and cargoes, a study of insurance, the Canada Shipping Act, regulations by government agencies.

MASONRY

MAS 10 MASONRY I (6½)

Introduction to the craft, tools and equipment, mortar mixing equipment, trade terminology, principles of bonding, introduction to shaped cuts, purpose made units, joints in brick and stone work, safety precautions, scaffolding, types of walls, efflorescence, green stain and its treatment, footings and foundations, technical workshop drawing, pilasters, buttresses, piers and columns, mortars, sands, limes, cements, manufacture of structural clay products.

MAS 20 MASONRY II (6½)

Introduction to the course, power look in the industry, time and motion study, placement organization, problems in bonding layout of patternwork, arches, workshop geometry, single and double attached piers, acute and abtuse angles, reveals and rebates, radius junctions, tee junctions, modular co-ordination, safety and scaffolding, shoring-dead, raking, horizontal underpinning, mortar types, manufacture of portland cement, concrete masonry units, S.C.R. units.

MAS 30 MASONRY III (6½)

Estimating brick and mortar, modular and non-modular, workshop geometry, rat-trap bonds, Gilbreth patterns, advanced bonding in streight lengths. Reinforced grouted brick masonry, dampproofing and waterproofing site lay-out transit, fireplaces, circular work, refractories, adhesives, insulating materials, grouts, concrete, fireclays.

MATHEMATICS

MATH 10 MATHEMATICS (½)

Business mathematics; fundamentals operations, interest, trade discounts. Basic bookkeeping; the balance sheet, classified financial statements, specified journals. Business practice; retailing, contracts and credits, insurance, banking and interest, taxes, licensing and lease, causes of business failure, forms of organization, promotion plan and policies, business language and communication.

MATH 11 MATHEMATICS (½)

Arithmetic; operations with whole numbers, addition and subtraction, multiplication and division, fractions, decimals, percentage, calculation of percent, interest and trade discounts. Weights and measures; linear, square and cubic measure, weights. Right triangle relationship; calculation of square root and diagonals.

MATH 12 MATHEMATICS (½)

Arithmetic operations; whole numbers, fractions, decimals. Percentage; simple percentage, interest, trade discounts. Measurements; linear measure, square measure, board measure, cubic measure, weight measure. Right triangle relationship; calculation of square root, Pythogoras' theorem, calculation of diagonals, tafter line, bracing.

MATH 13 MATHEMATICS (½)

Arithmetic; whole numbers, fractions, decimals. Weights and measures; units of weight, units of capacity, quantity estimating, elements of costing and estimating. Percentage; methods of calculation, profit and loss, trade discounts, simple interest, calculation of taxes.

MATH 14 MATHEMATICS (½)

Fundamental operations; fractions, decimals, substitution, square root. Algebra; operations with signed numbers, simple linear equations, fractional equations. Mensuration; angle measure, linear measure, area measure, Pythagoras' Theorem, volumetric measure, special units. Percentage; percentage formula, practical application.

MATH 15 MATHEMATICS (½)

Fundamental operations; fractions, decimals. Percentage; simple interest, trade discounts, percent error, averages. Weights and measures; linear and liquid measure, metric system and English system, angular measure. Powers and roots; calculation of square root, right triangle relationship, calculation of diagonals.

MATH 16 MATHEMATICS (½)

Arithmetic operations: whole numbers, fractions, decimals. Percentage: solution of percentage, simple interest, trade discounts. The right triangle: calculation of square root, right triangle relationship, calculation of offsets.

MATH 17 MATHEMATICS (½)

Arithmetic processes: whole numbers, fractions, decimals, percentage, simple interest, trade discounts. Right triangle: calculation of square root, right triangle relationship.

MATH 18 MATHEMATICS (½)

Algebra: fundamental operations, linear equations, formula, factoring, fractional equations, laws of exponents, simultaneous equations, quadratics.

MATH 19 MATHEMATICS (½)

Arithmetic processes: whole numbers, fractions, decimals. Percentage: simple interest, trade discounts. Mensuration: weights and measures, calculation of perimeters, areas and volume, units of capacity, formula applied to trade problems.

MATH 20 MATHEMATICS (½)

MATH 21 MATHEMATICS (½)

Review or arithmetic: fractions, decimals, square root, percentage. Review as necessary all principles, operations and formulae from Term I. Mensuration; area calculation, rectangles, circles. Ratio and proportion: direct and inverse ratios, direct and inverse proportion, similar figures, taking off quantities. Mensuration: review of right angle triangle relationship, English units of capacity and weight, special units of volume, area calculations, volume calculations.

MATH 22 MATHEMATICS (½)

Review: fractions, decimals, percentage. Review as necessary all principles, operations and formulae from Term I. Mensuration: area calculations, rectangles, triangles, circles. Powers and roots: application of right triangle to trade, calculations, solution of trade formula. Ratio and proportion: ratio, direct, indirect, proportion, direct, indirect, scales and scale readings, calculations of pitch, rise, span.

MATH 23 MATHEMATICS (½)

Review: arithmetic processes, whole numbers, fractions, decimals, percentage. Review as necessary all principles, operations and formulae from Term I. Introduction to bookkeeping: the work sheet specified journals, financial statements, accounts. Estimating: units, systems, trade unit, conversion, calculation of quantity, principles of costing, the inventory.

MATH 24 MATHEMATICS (½)

Review: square root, right angle triangle, fundamental algebraic operations. Review as necessary all principles, operations and formulae from Term I. Formula: literal equations, practical applications. Ratio and proportion: direct and inverse ratios, direct and inverse proportions, practical applications. Algebra: exponent laws, standard numbers, linear equations, radical equations, solution of formula, simultaneous equation, graphs.

MATH 25 MATHEMATICS (½)

Review: fundamental operations, square root, right triangle. Review as necessary all principles, operations and formulae form Term I. Mensuration areas of plane figures, rectangles, square, triangles, circle, volume, rectangular solids, cylinders. Algebra: fundamental operations, formula applied to shop calculations. Ratio and proportion: ratio, direct and indirect, proportion, similar triangles, gear ratios, pulley speeds, belt widths, scale and conversions.

MATH 26 MATHEMATICS (½)

Review: arithmetic operations, percent, square root, right triangle calculations for offsets. Review as necessary all principles, operations and formulae from Term I. Mensuration: angle measure, linear measure, area measure, cubic measure, calculation of pipe circumference, cross sectional area, capacity of rectangular tanks, calculation of weights.

MATH 27 MATHEMATICS (½)

Review: arithmetic operations, calculation of square root, right triangle relationship. Review as necessary all principles, operations and formulae from Term I. Mensuration: linear and angular measure, perimeter calculations and formulas, area measure, weight measures and calculation. Simple formulae and equations.

MATH 28 MATHEMATICS (½)

Review: geometry of plane figures. Review as necessary all principles, operations and formulae from Term I. Geometry: angular measure, definitions and terminology, properties of triangles, properties of the circle. Computation: calculations with logarithms, calculations with slide rule.

MATH 29 MATHEMATICS (½)

Review: arithmetic operations. Review as necessary all principles, operations and formulae from Term I. Right triangle: calculation of square root, right triangle relationship, calculation of offsets. Mensuration: properties of the circle, calculation of pipe capacities and flow, calculation of weights.

MATH 31 MATHEMATICS (½)

Review of arithmetic, fractions, decimals, square root, percentage, right triangle relationship. Review as necessary all principles, operations and formulae from Terms I and II. Basic algebra: fundamental operations, simple equations, solution of formula, manipulation of trade formula, application of formula to trade problems.

MATH 32 MATHEMATICS (½)

Review fractions, decimals, percentage, right triangle relationship, square root. Review as necessary all principles, operations and formulae from Terms I and II. Mensuration: area calculations, irregular figures, surface area, volume calculations, cubes and rectangles, cylinders. Estimating: estimating materials and costs, calculation of labour costs, measurments.

MATH 33 MATHEMATICS (½)

Review as necessary all principles, operations and formulae from Terms I and II. Business practice: calculations of payroll and wages, insurance, taxes, Workman's Compensation, wage earners lien, elements of bookkeeping, and practical application to small business operation.

MATH 34 MATHEMATICS (½)

Review as necessary all principles, operations and formulae from Terms I and II. Trigonometry: ratios, sine, cosine, tangent, functions of angles of any magnitude, solution of oblique triangle, sine law, cosine law, vector composition, vector resolution, radian measure: application of trigonometry to electrical problems.

MATH 35 MATHEMATICS (½)

Review as necessary all principles, operations and formulae from Terms I and II. Mensuration: application of formula to workshop, calculations, measuring irregular forms, calculation of cutting speeds. Trigonometry; natural functions, solution to the right triangle, calculation of tapers and wedges, measuring angles with sine bar, measuring angle cuts.

MATH 36 MATHEMATICS (½)

Review as necessary all principles, operations and formulae from Terms I and II. Mensuration: review units of measure, weights and measures, area of plane figure, surface area, pipe and tank capacities, rate of flow, water measure. Ratio and proportion: ratio, proportion, ratio of pipe capacities, similar figures, scale reading, scale conversions, conversion of units and measure. Algebra: fundamental operations, simple equations, solution of formula, trade calculations by formula.

MATH 37 MATHEMATICS (½)

Review as necessary all principles, operations and formulae from Terms I and II. Ratio and proportion: ratio, proportion, similar figures, ratio applied to scale drawings, scales and scale conversions. Mensuration: calculation of perimeters, plane area and surface area by formula, calculation of slant height of cone and pyramid, arc lengths, volumes and capacity. Formula: formula manipulation, application of formula to special problems.

MATH 38 MATHEMATICS (½)

Review as necessary all principles, operations and formulae from Terms I and II. Trigonometry: trigonometric functions, solution of the right triangle, problems in surveying involving the right triangle, solution of oblique triangles, sine law, cosine law, calculations in stress and structure, problems.

MATH 39 MATHEMATICS (½)

Review as necessary all principles, operations and formulae from Terms I and II. Ratio and Proportion: ratio, proportion, pulleys and gears, scale conversions and readings. Algebra: fundamental operations, solution of linear equations, manipulation of trade formula.

MATH 50 MATHEMATICS (2)

Business mathematics: fundamental operations, interest, trade discounts. Basic bookkeeping: the balance sheet, classified financial statements, specified journals. Business practice: retailing, contracts and credits, insurance, banking and interest, taxes, licensing and lease, causes of business failure, forms of organization, promotion plans and policies, business language and communication.

MATH 55 MATHEMATICS (½)

Whole numbers: fundamental operations. Fractions: fundamental operations, conversion of fractions and decimals. Averages and percent. Linear measure. Simple linear equations.

MATH 65 MATHEMATICS (½)

Shop formula: cutting speeds, screw threads, gear, belt and pocket type drives.

MATH 75 MATHEMATICS (½)

Ratio and proportion. Angle measure. Volumetric measure; right prisms. Med-ordinate rule applied to irregular shaped forms.

MATH 60 MATHEMATICS (2)

MATH 100 MATHEMATICS (4)

Computations with measured quantities, metric and English system. Algebra: linear equations, simultaneous equations, quadratic equations, higher degree equations. Logarithms, trigonometry: right triangle, oblique triangle, compound and multiple angles, sum and product formula for angles, properties of triangles and circles, functional concept and functional notations, introduction to series, introduction to analytical geometry, introduction to differential calculus.

MATH 101 MATHEMATICS (4)

Slide rule, applied geometry, review of basic algebra, review of basic trigonometry, logarithmic operations. Functions and graphs. Systems of linear equations, exponents and radicals, quadratic equations in one unknown, ratio and proportion, introduction to analytical trigonometry. Oblique triangles, angular measurement, properties of triangles and circles, complex numbers and position vectors, trigonometric formulas, equations and identities.

MATH 102 MATHEMATICS (3)

Algebra, quadratic equations: geometry, drawing of lines, perpendiculars, divisions: triangles, drawing and construction, Pythagoras theorum, related to navigation; trigonometry, radian and sexagesimal measure, function tables, logarithms: sine, cos, tan ratios, identities, graphs.

MATH 103 MATHEMATICS (1)

Common logarithms, standard notation, volumes and surfaces of solids, formulae, manipulation, percentages; Ratio, proportion; Simpson's Rules; Factorization, variation, simultaneous equations; Theory of indices, naperial logarithms; Radian measure, trigonometry.

MATH 104 MATHEMATICS (1)

Graphical work: sin, cos, tan, $\pm 360^\circ \sin(wt + x)$. Straight line; Simultaneous linear equations; Determination of laws of linear form; Geometry; cengarient and similar triangle; Pythagoras, intersections, areas, segments of circle, ellipse and parabola.

MATH 110 MATHEMATICS (3)

Elementary mathematics for the industry: Arithmetic processes — operations with whole numbers, fractions, decimals, square root. Percentages: simple and compound interest, trade discounts, food costs. Mensuration: weights and measures, volumetric measures, metric system. Ratio and proportion. Graphic representation. Increasing and decreasing quantities in recipes. Calculating portion costs and selling prices. Calculating portion sizes and amounts to purchase. Yield tests.

MATH 130 MATHEMATICS (3)

Arithmetic processes: fractions, decimals, square roots. Logarithms: fundamental operation. Slide rule: fundamental operations. Practical geometry: properties of triangles, circle. Areas: measurement of plane figures, the S formula. Volume: units of volume and capacity, the right prism, the cone and pyramid, the sphere and solid ring. Algebra: fundamental processes, indices, theory of logarithms, linear equations, simultaneous equations, quadratic equations, quadratic surds. Ratio and proportion: direct and inverse ratios, direct and inverse proportion, similar and contingent figures, variation, application to practical calculations. Trigonometry: angle measure, functions of acute angles, the reciprocal ratios, the co-functions, solution of the right triangle, application of the slide rule, application of logarithms, functions of any angle, solution of the oblique triangle, sine and cosine laws, area of triangles, application to practical problems.

MATH 131 MATHEMATICS (3)

Arithmetic processes: fractions, decimals, square root. Powers of ten: the standard number, laws of indices, fundamental slide rule operations. Algebra: fundamental operations, linear equations, simultaneous equations applied to Kirchhoff's Laws, quadratic equations, functional notation. Logarithms: fundamental operation, calculation of decibel and power ratios. Graphs: cartesian co-ordinates, monographs, representation of functions. Trigonometry: angle measure, the degree, the radian, ratios of acute triangles, solution of right triangles, impedance diagrams, graphs of sine and cosine functions, resolution of wave forms. Plane vectors: vector representation, vectors as complex numbers, polar quantities, conversion of rectangular and polar forms. fundamental vector algebra, application to L.C.R. circuit analysis. Slide rule: extension of slide operations, operations with complex numbers, trigonometric solutions of triangles.

MATH 132 MATHEMATICS (3)

Arithmetic processes: fractions, decimals, square roots, Applied geometry; properties of the right triangle; Pythagoras' theorem, the circle, area and circumference, sectors and segments. Volumetric measure: weights and measures, capacity of tanks and piping, calculation of rates of flow. Algebra: fundamental operation, equations, linear, simultaneous, quadratic, formula, manipulation, evaluation, indices, powers of ten, standard numbers, slide rule operations. Logarithms: fundamental operations, calculations involving trade formula. Trigonometry: ratios of any angle, solution of right triangles, oblique triangle, sine and cosine law, resolution and composition of vectors. Proportion: direct and inverse ratios, direct and inverse proportion, application to pulleys and gears, scale conversions. Units: English units, metric units — M.D.S. system, C.G.S. system — conversion factors and calculations.

MATH 133 MATHEMATICS (1)

Arithmetic processes: operations with whole numbers, fractions, decimals, use of scales, square root. Percentages: simple interest, loans and financing, trade discounts. Mensuration: weights and measures, area of plane figures, volumetric measure, units of capacity. Ratio and proportion: direct and inverse ratios, direct and inverse proportion. Applied geometry: geometrical constructions, right angle triangle, properties of plane figures. Fundamental algebra: fundamental operations, linear equations, shop formula. (One semester)

MATH 134 MATHEMATICS (3)

Arithmetic: whole numbers, fractions, decimals, square root. Percentage: simple interest, trade discounts. Mensuration: linear measure, area measure, geometry of plane figures. Pythagoras' theorem. Ratio and proportion: similar figures, scales and scale conversions. Business mathematics: basic bookkeeping, retailing, insurance and investments, taxes, licensing and leases, bankruptcy and insolvency.

MATH 135 BUSINESS MATHEMATICS (1)

Whole numbers: fundamental orerations, addition and subtraction, multiplication and division. Fractions: addition and subtraction, multiplication and division by whole numbers. Decimals: addition and subtraction, multiplication and division by whole numbers, calculations involving dollars and cents. Percentage: calculation of percent, calculation of taxes involving percent, bill total and percent increase. (One semester)

MATH 136 MATHEMATICS (2)

Review: arithmetic operations, fractions, decimals, percentage, square roots. Linear measure: units of measurement, specialized linear units, perimeters of rectangles and squares, circumference of a circle. Area measure: units of measurement, rectangles and triangles, the right angle triangle, Pythagoras' theorem, area of plane figures. Volumetric measure: units of volume, units of capacity and weight, volumes of right prisms, weights and measures. Algebra: fundamental operations, linear equation, simple formula, application to practical problems. Trigonometry: definition of angle, sine ratio, cosine ratio, tangent ratio, application of trigonometric ratios to workshop problems, the right angle triangle. Ratio and proportion: direct and indirect ratios, direct and indirect proportion, shop calculations, scales and scale reading. Applied geometry: properties of angles, properties of triangles, properties of circles, application to mensuration.

MATH 137 MATHEMATICS (4)

Review of basic processes: addition, subtraction, multiplication and division of integers, fractions and decimals, ratio and proportion, percentage, powers and roots, measurement of area; volume and capacity. Algebra: algebraic notation, signed numbers, equations and formula. Geometry: properties of geometric figures, fundamental construction. Trigonometry: trigonometric ratios, solution of right angled triangles, sine and cosine laws, solution of acute angled triangles, use of logarithms and standard tables. Solution of problems concerned with screw threads, tapers, gear ratios, speeds and feeds, simple and compound indexing.

MATH 200 MATHEMATICS (4)

Analytical geometry, differential calculus, differentiation of a function, products, quotients, implicit functions, trigonometrical functions, practical application to rates, harmonic motion, electrical problems, inegration, definite integral, areas under curves, volumes, length of plane curves, differential equations, applications to problems of growth and decay.

MATH 201 MATHEMATICS (4)

Language of algebra, binomial theorem, logarithms; review, exponential; functions, introduction to analytical geometry, trigonometry. Introduction to differential calculus. Introduction to integral calculus.

MATH 202 MATHEMATICS (3)

Functions of related and co-related angles, numerical values of trigonometric ratios of angles of any magnitude, expansion formula for compound and multiple angles, transformation formulas for sums and products, properties of triangles, polygons and circles. The oblique spherical triangle, progressions, series of natural numbers, double arithmatic series, variation. Development of navigational formula.

MATH 203 MATHEMATICS (1)

Calculus: differentiation x^4 function of maximum and minimum; A and G series; Binominal theorem, indices; Vector addition complex numbers, De Moirvés theorem.

MATH 204 MATHEMATICS (1)

Calculus: slope of curves, points of inflexion. Differentiation of sum; product quotient; Integrations of ax^4 aa^x $aa^x + b \sin (ax + b)$.

MATH 210 MATHEMATICS (2)

Binomial theorem. Permutations and combinations. Quadratic equations. Exponential functions and rate of growth. Basic computer mathematics. Statistical analysis.

MATH 302 TRIGONOMETRY AND NAVIGATION (1)

A more detailed study of the relationship between oblique and right-angled plane and spherical trigonometry and its relationship to celestial navigation. Napiers rules for circular parts, projection orthographic, equidistant and sterographic. Spherical triangles, the spherical sine formula and the cosine formula, derivation of meridional parts. (One semester)

MATH 303 MATHEMATICS (1)

Integration by substitution, by parts, definite and indefinite fractions, partial fractions. Applications of calculus; bending beams, power, rates of change, velocity, acceleration. (One semester)

MATH 304 MATHEMATICS (1)

Integration: areas under curves, moments of inertia, of volume, of area, volumes of revolution, parallel axis; centres of pressure, centres of gravity; R.M.S. values. Co-ordinate geometry: equations of straight lines, parabola, hyberbola, tangent, normal, parameters. (One semester)

MATH 305 MATHEMATICS (1)

General review with relations to logarithms, the anti-log., hour angles, conversion of time to arc and arc to time, measurements of time in relation to celestial bodies, problems in right-angled and spherical trigonometry, measurement of trigonometry problems in navigation, measurements of angles in terrestrial and celestial navigation, algebraic equations, proof of formula used in navigational problems, subject general review. (One semester)

MECHANICAL

MECL 100 BUILDING CONSTRUCTION AND DRAFTING (2)

Site selection, excavation, soils and simple tests, dewatering well points, footings, grade beams, grillage foundations, piles, caissons, waterproofing, wood joints, sub-floor, roof carpentry, construction equipment, power and hand tools, scaffolding, hoists, shores, sheeting, needling, underpinning, winter protection, field trips to study construction procedures, detailing construction elements, principles of survey practice.

MECL 101 PLUMBING INSTALLATIONS (5)

Properties and specifications of plumbing materials, methods of jointing and supporting, underground drainage design, storm, sanitary and combined systems, municipal sewage designs and sewage treatment, inspection of plumbing installations, types and purposes of vents and venting specifications, sizing of vents, drains and stacks, municipal water treatment, cold and hot water systems for buildings, types and location of valves, hot water tanks, safety valves.

MECL 102 STEAMFITTING INSTALLATIONS (5)

Boiler designs and specifications, properties of fuels, heat calculation, temperature and pressure relationship, coefficients of building materials, heat loss calculations, sizings and selection of boilers and circulating pumps, radiator design, thermostatic and motorized valves, gravity heating systems, forced heating systems, zoning, testing, special controls and devices, baseboard heating, high temperature high pressure systems, design, purpose and location of convertors.

MECL 103 PRINCIPLES OF REFRIGERATION (3)

Principles of refrigeration, pressure, enthalpy diagrams, evaporators, metering devices, compressors, condensors, accessories, controls, psychrometric charts, tools, tube bending, silver brazing, flaring, system construction and testing, troubleshooting.

MECL 200 BUILDING CONSTRUCTION (3)

Quantity surveying, methods of measurement, take-off and calculations of simple structures, contracts and specifications, contract law, standard forms, on-the-job modifications, building construction drawings, reinforced concrete, structural steel, timber, detailing plan interpretation, field trips.

MECL 201 PLUMBING INSTALLATIONS (3)

Purposes of drain plans, sizing of storm, sanitary and combined drains, special drainage equipment, oil and grease interceptors, drainage and sewage sump pumps, back flood control, indirect waste pipes, special wastes, pressures and heads of water systems, pressure reducing valves, hydrapneumatic water systems, tankless booster systems, cross connections in water supply, water pipe sizing, hospital and restaurant fixtures and equipment, fire line installations, estimating.

MECL 202 STEAMFITTING INSTALLATIONS (3)

Properties of steam, types of boilers, boiler accessories, one pipe steam cycle, two pipe steam cycle, steam traps, vapour steam cycle, condensate return pump cycle, vacuum return pump, accumulate tank, flush tank, life fitting, controls (pneumatic), temperature-pressure relationship, differential controller, selector thermostat controls, sub-atmospheric systems, exhaust steam, high and low pressure systems, feed water heaters and connections, superheaters and desuperheaters, economizers, injectors and ejectors, steam coils, calculations of boiler ratings and pump sizing.

MECL 203 PRINCIPLES OF AIR CONDITIONING (4)

Human comfort systems, psychrometry, load analysis, distribution of air, heating systems, control systems, measuring and metering instruments, electrical and pneumatic controls.

MECHANICS

MECH 100 MECHANICS I (3)

Statics, force systems, moments of a force, friction, second moments of inertia, stress, strain, Young's modulus. Dynamics: velocity and acceleration, displacement, sign convention, laws of motion, Galileo's equations, inertia force, angular displacement velocity, acceleration units, radius of gyration, work, energy and power, impulse momentum impact.

MECH 101 MECHANICS (2)

Forces, concurrent and concurrent co-planar. Forces — friction. Centroids and centres of gravity. Second moments of area. Machines. Dynamics. Motion in a straight path (rectilinear motion) impulse, impact, momentum. Rotational motion. Work, energy and power.

MECH 102 MECHANICS (2)

Statics, force systems, moments of a force, friction, second moments of inertia, stress, strain, Young's modulus. Dynamics: velocity and acceleration, displacement, sign convention, laws of motion, Galileo's equations, inertia force, angular displacement velocity, acceleration units, radius of gyration, work, energy and power, impulse momentum impact.

MECH 105 MECHANICS (2)

Definitions of mass: force, weight, scalar and vector quantities, British and Metric systems of units, resultant and equivibrant of a system of coplanar forces, resolution of forces, parallelograms of forces, triangle of forces, Bow's notation.
Moments, couples, levers, centroid and centre of gravity principle of moments.
Work done by a force, graphical representation, units power and energy.

MECH 110 MECHANICS OF MATERIALS (2)

Principles of statics, centres of gravity, properties of materials, fundamental stress-strain relationships, thick and thin wall cylinders, torsion, shear and bending in statically determinate beams, design of beams, deflection of simple beams, columns, combined stresses.

MECH 200 MECHANICS II (3)

Review of force systems: concurrent coplanar forces, non-concurrent coplanar forces. Friction: motion on inclined plane, funicular polygon, beam reactions. Framework: live and dead loads, roof frames and force diagrams, beams and bending, angular motion, belt drives and flywheel rims, friction torque. Motion in a circular path: harmonic motion, moment of inertia, radius of gyration. Hydrostatics. Hydraulics: flow equations, Bernovilli's principle.

MECH 201 MECHANICS OF MATERIALS (2)

Review of statics, stress-strain relationships, loading induced stresses and failure. Testing methods and equipment. Properties of sections. Bending and deflection of machine sections. Joints and connections, compression members, torsion, combined stresses.

MECH 202 MECHANISMS-ANALYSIS and DESIGN (KINEMATICS) (2)

Techniques of Mechanism Analysis. Displacement — (linear, angular) paths of points on rotating bodies, producing specific paths. Linkages — to produce a given path, basic four bar, crank and solider, quick return, reverse, slow motion, etc.
Graphic analysis of motion velocity and acceleration, gears and gear trains, cams.

MECH 210 MECHANICS OF MATERIALS (2)

Advanced calculations and diagrams: loading, shear forces and bending moments for simply supported beams, cantilevers and continuous beams, reinforced concrete design, typical slabs, columns, beams, foundations, stairs, cantilevers, retaining walls, structural steel design, standard sections and their characteristics, use of tables, selection of sections, beams, stanchions, columns, plate girders, riveted, bolted and welded connections, steel roof truss design, details of joints.

METALLURGY

MET 100 METALLURGY (2)

Atomic theory of metals: metallic states, grain formation and growth, metal deformation, mechanical properties, heat treatment of metals. Iron and steel: iron-carbon equilibrium diagram, types, properties and uses of cast iron, production, types, properties and uses of steel. Production, properties and uses of non-ferrous metals: aluminum and its alloys, copper and its alloys, magnesium and its alloys, nickel and its alloys, lead and its alloys.

MET 101 METALLURGY (2)

Iron, steel, direct reduction processes, wrought iron. Cast iron, alloy constitution diagrams. Heat treatment, physical metallurgy, alloy steels. Physical testing. Non-ferrous metals.

MET 109 METALLURGY (2)

Materials used in the construction of marine boilers and engines. Sources of various metals. Production methods of steel and iron. Castings. Steel and iron process. Steel and iron treatment. Various types of steel and iron. Steel alloys. Strength and composition of steel, iron and steel alloys. Properties of various ferrous metals. Testing.

MET 110 METALLURGY (3)

Non-ferrous metals: sources and manufacturing methods, properties, treatments. Various alloys and their composition and properties. Strength and testing.

MET 130 METALLURGY I (2)

An introduction to the base metals commonly used in the watchmaking and jewellery trades. A more complete coverage in the precious or "noble" metals, namely the mining, refining and preparation from the raw ores to the finished metal as used by the craftsmen.
An introduction also to the acids and liquids commonly used in cleaning, soldering, etc., in each of these affiliated trades.

MET 131 METALLURGY II (2)

An introduction to the methods of testing yellow and white metals to enable the craftsman to buy old precious metals with the accuracy required to make a profit. A more complete coverage of the precious metals which the jeweller as well as the watchmaker buys, sells or repairs in his normal daily operations.

MET 132 METALLURGY (2)

Iron, steel, wrought iron, cast iron, aloly constitution, diagrams, iron; Fe_3C System, heat treatment, physical metallurgy, alloy steels, physical testing, non-ferrous metals.

METROLOGY

METR 100 METROLOGY (2)

History and basic principles: basic instrumentation, dial gauges and test indicators, surface plates, micrometers and verniers, gauge blocks, optical instruments and testing. Surface finish screw threads, gears. Angular measurement, fixed gauges, air gauging, autometrology.

MILLWRIGHT

MILL 10 MILLWRIGHT I (5)

Use and care of hand tools, benchwork, layout and measurement, drilling, reaming, fasteners and anchors, applications and installation, lathe and milling machine operation, ferrous metals and their properties and heat treatment.

MILL 20 MILLWRIGHT (5)

Rigging and hoisting, machines and hardware, strength of beams, power transmission devices, shafts, bearings, couplings, clutches, belts, chains, gears, speed reduction units, lubrication, conveyers, standard tapers, calculations, taper turning, gaskets and gasket materials, non-ferrous metals and their properties.

MILL 30 MILLWRIGHT III (5)

Pumps, compressors, packing, seals, basic hydraulic theory, hydraulic pumps, piping, motors, cylinders, valves and simple circuits, filters, strainers, transit, theodolite and levels and their application to alignment of machinery. Review of metallurgy, S.A.E., and A.I.S.I., numbering systems.

PAINTING and DECORATING

PAINT 10 PAINTING AND DECORATING I (6½)

Brushes, tools and equipment: their use, care and maintenance. Paint materials: pigments, mediums, thinners and stainers, origins, characteristics and chemical properties. Preparation of surfaces for painting. Plain painting and varnishing, lining and stencil work, colour theory and practice in colour matching, lettering, safe working practices.

PAINT 20 PAINTING AND DECORATING II (6½)

Paperhanging I: preparation of new and old surfaces to receive wallpaper, interlining and hanging of conventional wallpapers. Wood staining and varnishing, colour practice, glazing and antiquing.

PAINT 30 PAINTING AND DECORATING III (6½)

Paperhanging II: hanging better quality wallpapers and specialty papers. Introduction to the hanging of fabrics and vinyls. Lay-out of wall surfaces. Spray painting: principles of spraying equipment choice, care, cleaning and maintenance, paints, varnishes and lacquers applied by spray; health and safety measures.

PHYSICAL EDUCATION

P.E. 161 SWIMMING AND WATER SAFETY (1)

Swimming is a compulsory subject for child care students. Students are expected to reach a standard equivalent at least to Red Cross or Royal Life Saving Society Intermediate level.

Ability to swim and proficiency in life saving are essential skills for people who work with children, particularly disturbed or handicapped children.

PHYSICS

PHYS 10 PHYSICS (½)

Air: chemical and physical properties, atmospheric pressure, calculation of wind pressure, humidity, moisture content of lumber. Water: chemical and physical properties, pressure at a depth, calculation of pressure on form work, capillary action. Properties of building materials: density, solids, liquids, granular substances, specific gravity, strength of materials.

PHYS 11 PHYSICS (½)

Force: graphical representation, triangle of forces, turning effect of a force. Strength of materials: stress and strain, factor of safety. Young's modulus of elasticity. Heat: temperature, scales, quantity of heat, effects of heat.

PHYS 12 PHYSICS (½)

Air: chemical and physical properties, pressure and vacuum, gauge pressure and absolute pressure. Water: chemical and physical properties, density and specific gravity, capillary action. Hydrostatics, principle of the siphon, comparison of lift pump and force pump, principle of the manometer, mercury barometer and Aneroid barometer, well and cistern barometer, vacuum pump, pressure at a depth.

PHYS 13 PHYSICS (½)

Air: physical and chemical properties, pressure and vacuum, effects of variation in pressure on equipment, measurement of pressure, calculation of pressure in ducts. Water: physical and chemical properties, density and specific gravity, calculation of pressure at depth, capillarity.

PHYS 14 PHYSICS (½)

Properties of matter: solids, liquids, gases. Hydrostatics: atmospheric pressure, manometer, mercury barometer, gauge and absolute pressure, principle of the siphon. Hydraulics: Pascal's Law, fluids under pressure.

PHYS 15 PHYSICS (½)

Air: chemical and physical properties, density and specific gravity. Hydrostatics: atmospheric pressure, pressure and vacuum, gauge and absolute pressure, measurement of pressure, pressure at a depth, total force on surfaces, effect of variation of pressure on equipment.

PHYS 20 PHYSICS (½)

Review as necessary all principles, operations and formulae from Term 1. Heat and temperature: temperature scales, transmission of heat, effect of heat on building materials. Force: force as a vector representation. Force: vector representation, comparison of force and pressure, calculation of pressure on footings, resultant of two forces, action and reaction on supports, tension and compression in building members.

PHYS 21 PHYSICS (½)

Review as necessary all principles, operations and formulae from Term 1. Properties of materials: basic metallurgy, ferrous metals. Review: forces, principle of moments. Machines: principle of machines, mechanical advantage and efficiency, velocity ratio, level, wheel and circle, inclined plane, screw jack, gear drives, belt and chain drives.

PHYS 22 PHYSICS (½)

Review as necessary all principles, operations and formulae from Term 1. Hydraulics: Pascal's Law, transmission of pressure. Heat: temperature scales, effects of heat, evaporation, condensation, humidity. Hydrostatics: pressure head, calculation of pressure at a depth. Hydraulics: fluids under pressure, action of pressure pumps, action of the venturi, the water hammer.

PHYS 23 PHYSICS (½)

Review as necessary all principles, operations and formulae from Term 1. Heat: temperature scale, heat transmission. Strength of materials: tensile and compressive stress, basic metallurgy of ferrous metals. Heat: measurement of heat, specific heat of metals and air, calculation of heat capacity, humidity, relative humidity, effects of heat, calculation of expansion.

PHYS 24 PHYSICS (½)

Review as necessary all principles, operations and formulae from Term 1. Gas laws: expansion and compression of gases, Boyle's Law, vacuum pump, compression pump. Work, energy and power: units of energy, calculations of horsepower. Heat: temperature scales, calculation of heat capacity, specific heat of solids, liquids, gases, coefficients of expansion, expansion of gases, Charles' Law, change of state, effect of pressure on B.P. and F.P., sensible and latent heat, B.T.U. graph, transmission of heat.

PHYS 25 PHYSICS (½)

Review as necessary all principles, operations and formulae from Term 1. Heat and temperature: temperature scales, transmission of heat, change of state, humidity, calcuation of quantity of heat. Review: pressure and force, hydrostatics. Hydraulics: Pascal's Law, fluids under pressure. Machines: principle of machines, mechanical advantage and efficiency, work, energy, power, calculation of horsepower, horsepower of motors and compressors.

PHYS 30 PHYSICS (½)

Review as necessary all principles, operations and formulae from Terms 1 and 2. Structures: Bow's notation, triangle of forces, equilibrium of basic building frames. Moments: principle of moments, reactions of beam supports. Strength of materials: stress and strain, tensile, compressive, shear, comparison of lumber and other building materials.

PHYS 31 PHYSICS (½)

Review as necessary all principles, operations and formulae from Terms 1 and 2. Friction: laws of friction, effects of friction, coefficient of friction. Work, energy and power: units of energy and power, calculation of horsepower. Metallurgy: ferrous and non-ferrous metals, heat treatment.

PHYS 32 PHYSICS (½)

Review as necessary all principles, operations and formulae from Terms 1 and 2. Machines: principles of machines, work, energy, power. Properties of water: electrolysis and corrosion, hard and soft water, P.H. factor, water treatment. Heat: the B.T.U., calculation of quantity of heat, latent heat, heat transfer, coefficient of expansion. Properties of materials: metallurgy of plumbing materials.

PHYS 33 PHYSICS (½)

Review as necessary all principles, operations and formulae from Terms 1 and 2. Machines: principle of machines, mechanical advantage and efficiency, work, energy and power, calculation of horsepower for fan motors. Properties of materials: metallurgy, corrosion and electrolysis electro-potential series.

PHYS 34 PHYSICS (½)

Review as necessary all principles, operations and formulae from Terms 1 and 2. Properties of steam: latent heat and sensible heat, saturated and superheated steam, calculation of heat content. Heat energy: comparison of heat and mechanical energy, mechanical equivalent of heat, calculation of efficiency of heating plant, heat losses and prevention.

PHYS 35 PHYSICS (½)

Review as necessary all principles, operations and formulae from Terms 1 and 2. Applied electricity: fundamental units, electrical units of work, energy, power, basic circuitry. Heat: latent and sensible heats, changes of state of refrigerants, effects of pressure upon B.P. and F.P., mechanical equivalent of heat. Electrolysis and corrosion: hard and soft water, water treatment. Properties of trade materials: ferrous and non-ferrous metals, stainless steel piping.

PHYS 51 APPLIED PHYSICS (½)

Statics: definition of force, vector representation, composition and resolution of forces.

PHYS 61 APPLIED PHYSICS (½)

Stress and strain: definition of units, Young's Modulus of Elasticity, ultimate tensile strength, factor of safety, tensile compressive and shear stresses, physical and mechanical properties of metals.

PHYS 71 APPLIED PHYSICS (½)

Effects of heat: coefficient of expansion, heat treatment terminology.

PHYS 100 PHYSICS I (3)

Fluids: properties of fluids, hydrostatics, hydraulics. Heat and thermometry: the temperature scales, types of thermometers. Effects of heat: expansion of solids and liquids, expansion of gases. Heat measurement: units, specific heat, super heat, chemical efficiency of heating plant. Change of state: the TH diagram for water, nature of boiling and evaporization. Heat transfer: thermal conductivity measurement, the Stefan-Boltzenann Law. Thermodynamics: laws of thermodynamics heat engines, horsepower and efficiency calculations. Refrigeration: units of refrigeration, refrigeration systems, air conditioning, calculation of heat load. Sound: characteristics of waves, measurement of sound. Doppler principle, acoustics. Lighting: nature of light, properties of light, illumination and commercial lighting, ray optics, lenses, wave optics, polarization.

PHYS 101 PHYSICS (2)

Mechanics: review, hydraulics, heat energy, wave motion and sound, laboratory work.

PHYS 102 PHYSICS (2)

Time and measurement; space, and measurement; ratio, proportion, scaling; motion, in space and along a straight line; mass and the elements; atoms and molecules; gas, Brownian motion, fluid pressure.

PHYS 130 APPLIED PHYSICS (3)

Forces: graphical representation, composition of forces, equilibrium, triangle of forces, reactions, Bow's notation, resolution of forces. Moments: principle of moments. Stress and strain: Young's modulus of elasticity, ultimate tensile strength, factor of safety. Work, energy and power: force-distance graphs, units of energy and power, horsepower. Friction: effects of friction, co-efficient of friction. Machines: M.A. and V.R., law of machine, variation of efficiency, levers, wheel and axle, inclined plane, screw jack, gear drives, belt and chain drives. Heat and temperature; effects of heat, thermometry, quantity of heat, specific heat, heat transference. Latent heat: fusion and vaporization, boiler efficiency. Mechanical equivalent: relationship between mechanical electrical and heat energies. Fundamentals of electricity: D.-C. circuitry, electromagnetism, electromagnetic induction, principles of electrical devices, A.-C. characteritics. Basic metallurgy: iron and steel, alloy steels, stainless steels, heat treatment.

PHYS 131 APPLIED PHYSICS (3)

Electricity and magnetism: electrostatics, electricity in motion, non-linear resistors, network theorems, magnetism, inductance, capacitance, principles of electrical devices. Introduction to solid state physics: physics of the vacuum and gaseous tubes, principles of solid state devices, H. Parameters. Electrical measurements: Wheatstone bridge and application, principle of measuring devices. Mechanics: vector representation, velocity and acceleration, Newton's Laws, circular motion, work, energy and power. Sound: vibration and waves, transmission of sound, units of measurement. Light: wave optics, ray optics, science of colour. Heat: thermometry, quantity of heat, specific heat, heat transfer, transistor heat sinks, cabinet cooling, mechanical equivalent of heat.

PHYS 132 APPLIED PHYSICS (3)

Properties of matter: molecular structure of matter, capillary action and surface tension, characteristics of solids, liquids and gases, density and specific gravity. Hydrostatics: atmospheric pressure, gauge and absolute pressure, barometry, pressure at a depth, gravitational force in fluids, water supply systems. Hydraulics: Pascal's Law, principle of hydraulic devices, principle of pneumatic devices. Heat: thermometry, units of heat, calorific value, specific heat, effects of heat, coefficient of expansion, change of state. Gas laws: Charles' Law, Boyles's Law. Work, energy and power: units of energy and power, horsepower, efficiency of machines, principles of machines. Light: wave motion, ray optics, wave optics, interference and diffraction, polarization. Sound: units of measurement, inverse square law. Properties of materials, metallurgy of trade materials, corrosion and electrolysis. Forces: force diagrams, elementry structures.

PHYS 133 APPLIED PHYSICS (1)

Air: chemical and physical properties, pressure and vacuum, variations in atmospheric pressure, manufacture and storage of oxygen, acetylene, helium, argon, Co2. Water: chemical and physical properties, hydrostatics, humidity and condensation. Hydraulics: Pascal's Law, principle of hydraulic devices. Properties of trade materials: density and specific gravity, hardness, brittleness, tensile and compressive stress. Young's modulus of elasticity, basic metallurgy. Heat and temperature: thermometry, effects of heat upon trade materials, quantity of heat, specific heat, coefficient of expansion, melting points of metals. Work, power, and energy: units of energy and power potential and kinetic energy, horsepower. Electricity: Ohm's law, D.-C. circuity, principles of electromagnetism, electromagnetic inductance, D.-C. and A.-C. characteristics, principles of electrical devices. (One semester)

PHYS 134 APPLIED PHYSICS (1)

Air, chemical and physical properties, atmospheric pressure, pressure and vacuum, effects of variation of atmospheric pressure, manufacture of industrial gases. Water: chemical and physical properties, hydrostatics, hydraulic, Pascal's Law, principle of hydraulic devices. Strength of materials: stress and strain, basic metallurgy of trade materials. Heat: thermometry, quantity of heat, specific heats of trade materials, effects of heat. Work, power and energy: units of energy and power, potential and kinetic energy. Fundamentals of electricity: D.-C. characteristics, A.-C. characteristics, principles of electrical devices, basic circuitry.

PHYS 140 PHYSICS (2)

Forces: kinds, units, resultant, equilibrant, force systems; Principle of Moments and couples, law, effects and coefficient of friction, centroid and centre of gravity. Work, energy and power: work done by constant and variable forces, principles, mechanical advantage, and efficiency of machines, gear and belt drives, Pascal's Law, hydraulic and pneumatic devices, potential and kinetic energy, equivalence of electrical, mechanical and heat energy, horsepower. Mechanical properties of materials: stress and strain, Hooke's Law, Young's modulus of elasticity. Heat: thermometry, effects and transfer of heat, specific and latent heat of metals. Classification of substances: elements, compounds. Solutions and mixtures, physical and chemical properties of metals, electromotive series, corrosive of metals. Pure metals: crystalline structure of space, lattice units, allotropes, dendrites. Alloys: types of solid solutions, phases, effects of heat treatment, constitution of diagrams, metallic carbides and intermetallic compounds, formation of the eutectic and eutectoid. Magnets and magnetic substances. Light: reflection, refraction and dispersion of light, optical instruments and magnification.

PHYS 155 **PHYSICS (2)**

General physics with emphasis on electricity and magnetism.

PHYS 200 **MODERN PHYSICS (2)**

Electromagnetism: the spectrum. Atomic physics: bohr atom and line spectra, waves and particles, modern atomic model and Schroedinger wave equation, solid state physics, crystalline solids, classification by structure and by energy. Structure and behaviour of metals: physical states, alloy structure and behaviour of semi-conductors, theory of semi-conductors, semi-conducting materials, semi-conductor devices. Nuclear physics: introduction, relativity and the mass, energy equivalent, radioactivity, nuclear particles, nuclear energy.

PHYS 201 **PHYSICS (2)**

Light, reflection, mirror images; lenses, binoculars, telescope; refraction, index, dispersion; particle theory; waves studies; interference; Newton's Law of motion, vectors; work, energy, momentum; heat.

PHYS 300 **PHYSICS (2)**

Theory of machines. Stress analysis. A.-C. electrical circuits, single and multi-phase. Temperature measurement and control. Thermodynamics.

PHYS 310 **PHYSICS (1)**

Principle of the hyrometer, use of the hydrometer, in shipboard practice, effect of expansion and contraction in liquids and relationship to liquid cargos, a review of hydostatics and heat, problems from General Science. The manometer, thermometers, review problems from General Science. Anometers, the vector principle in anometers, light in relation to its usages in navigation. (One semester)

PLASTICS

PL 100 **MATERIALS — THERMOPLASTIC (3)**

Fundamentals and characterization of polymers. Introduction to basic resins. Engineering thermoplastics and natural polymers. Identification of plastics and elastomers by simple tests.

PL 101 **MATERIALS — THERMOPLASTIC (2)**

Fundamentals and characterization of polymers.

PL 102 **MATERIALS — THERMOPLASTIC (2)**

Introduction to basic resins. Engineering thermoplastics and natural polymers. Identification of plastics and elastomers by simple tests.

PL 103 **MATERIALS — THERMOSET (2)**

History and introduction to polyester and epoxy resins. Reinforcements and fillers. Strength of material definitions. Composites.

PL 110 **PROCESSES — THERMOPLASTIC (3)**

Fundamentals and principles of main processes. Forming and fabricating. Thermoforming. Coating and calendering.

PL 111 **PROCESSES — THERMOPLASTIC (2)**

Fundamentals and principles of main processes. Forming and fabricating.

PL 112 **PROCESSES — THERMOPLASTIC (2)**

Thermoforming. Coating and calendering.

PL 113 **PROCESSES — THERMOSET (2)**

History of processes. Applications. Safety and hygiene. Associated shop assignments — to produce typical patterns, moulds and parts.

PL 120 **DESIGN — THERMOPLASTIC (3)**

Fundamentals. Functional and production design problems. Mould manufacturing methods. Introduction to mould and die construction — injection moulds, extrusion dies, blow moulds and thermoforming moulds.

PL 121 **DESIGN — THERMOPLASTIC (2)**

Fundamentals. Functional and production design problems. Mould manufacturing methods.

PL 122 **DESIGN — THERMOPLASTIC (2)**

Introduction to mould and die construction-injection moulds, extrusion dies, blow moulds and thermoforming moulds.

PL 123 **DESIGN — THERMOSET (2)**

Design characteristics for glass fibre reinforced plastics. Plastic tooling. Reinforced plastic moulds and tooling. Wooden and metal moulds.

PL 200 **MATERIALS — THERMOPLASTIC (3)**

Fluorine polymers. The new plastics. Reinforced thermoplastics and elastomers. Material testing. Product testing. Material selection.

PL 201 **MATERIALS — THERMOPLASTIC (2)**

Fluorine polymers. The new plastics. Reinforced thermoplastics and elastomers.

PL 202 **MATERIALS — THERMOPLASTIC (2)**

Material testing. Product testing. Material selection.

PL 203 **MATERIALS — THERMOSET (2)**

Properties, chemistry, curing and quality control for thermo-setting resins: Polyesters, epoxies, alkyds, phenolics, silicones, amines, furnaces.

PL 210 **PROCESSES — THERMOPLASTIC (3)**

Material handling, control and records (part 1). Theory of extrusion; extrusion problems; special extrusion processes. Material handling, control and records (part 2). Theory and practice of injection, blow moulding and compounding.

PL 211 **PROCESSES — THERMOPLASTIC (2)**

Material handling, control and records (part 1). Theory of extrusion; extrusion problems; special extrusion processes.

PL 212 **PROCESSES — THERMOPLASTIC (2)**

Material handling, control and records (part 2). Theory and practice of injection, blow moulding and compounding.

PL 213 PROCESSES — THERMOSET (2)

Compression and transfer moulding. Machinery and equipment. Injection moulding of thermosets. Cold moulding.

PL 220 DESIGN — THERMOPLASTIC (3)

Process selection. Part design. Mould and die design. Finishing and assembly. Tooling. Heating and cooling systems.

PL 223 DESIGN — THERMOSET (2)

Process selection. Part design. Mould design. Finishing equipment.

PLASTERING

PLAS 10 PLASTERING I (6½)

Job conduct, responsibilities, tools of the trade, aggregates, gypsum, limes and portland cement, plaster backings, solid partitions, fire ratings, types of arches, related geometry, layout, areas and estimating, construction of small moulds and bench work.

PLAS 20 PLASTERING II (6½)

Duties of a mechanic, duties of a foreman, use of spirit and water level, squaring of rooms, flat and beamed ceilings, running of moulds, cutting and planting run bench work, mitring, stops and returns, repair work.

PLAS 30 PLASTERING III (6½)

Layout for grain and dome ceilings, related geometry, arches, mitring, acoustic tile layout, different types of moulds, acoustic materials, safety practices, texture work, small castings.

PLUMBING

PLUM 10 PLUMBING I (5½)

Safety precautions, steel pipe, measuring pipe, linear measure, calculation of 45 offset, lead, solder, and fluxes. Types of cast iron joints, hand tools and wrenches, heat transfer, properties of water, copper D.W.V., cast iron M.J., fundamentals of a good plumbing system, drainage terms, building trap, cleanouts and location, purpose of a drain plan. How to draw a drain plan, drain design, sanitary (function of) floor drains, storm (function of) R.W.L. foundations drains, municipal sewers, municipal drains, underground and above ground drainage materials. Joining dissimilar pipe material, pipe supports and managers. Purpose of stack elevation, plumbing fixture traps. Component parts of a stack pipe, stack footings, roof flashings, stack terminals, purposes of venting, siphonage, trans seal loss, glass pipe demo, requirements between a fixture trap and vent. Trap and vent sizes. Prohibited fittings and connections, types of individual vents, upper and lower vent connections, dual venting, how to draw a stack elevation, stack elevation, simple wet venting, fixture units and hydro loads, assignment work, simple group vent sizing.

PLUM 20 PLUMBING II (5½)

Residential H.W. tanks and heaters, British thermal units, T. and P. valves, temp. conversion, review and expand waste and vent siz., review stack elevation work, expand on stack venting, stack elevation, domestic dish and clothes washers, Class I floor drains, methods of mechanical priming, drain plan, grading waste pipes, valves, location of valves, water services, meter and bypass, W.C. bowls, areas and volumes, pressures and heads, basic pumps, W.C. tanks and ball cock valves, rough-in fixture cuts, combined drainage system, drains on filled ground, datum line, instrument readings, grading assignment work, blow down tank, oil interceptors, sumps and ejectors, loop and circuit venting, stack elevation, yoke venting, offsets in stacks, combined vent terminals, grease interceptors, sleeving.

PLUM 30 PLUMBING III (5½)

Pressure and heads, commercial H.W. tanks, indirect heaters, Domestic H.W. circ. lines and pumps, water hammer, water supplies to high buildings, pressure reducing valves, tempering valves, cross connection, source of water, well pumps, hydro pneumatic systems, water softeners including demonstration, fire line installation, water pipe testing, special fixture trap locations, indirect and special wastes, corrosive drainage materials, septic tanks, disposal beds, rolled offset, friction loss in water piping, semi-combined drainage system, municipal water treatment, hospital fixtures, ventilation of washrooms.

PSYCHOLOGY

PSY 160 GENERAL PSYCHOLOGY (2)

This is an introductory course. Study of the response capabilities of human beings leads to consideration of human motivation, perception and the learning process. Theories of personality development and the concept of roles are discussed. The nature of intelligence and psychological testing together with the meaning of elementary statistical terminology are related to the study of children.

PSY 161 DEVELOPMENTAL PSYCHOLOGY (4)

This is a basic care subject dealing with the sequence of growth and behaviour from birth to maturity. Normal patterns of social, emotional and intellectual development are studied, taking into account hereditary factors and socio-cultural influences. Manifestations of normal difficult behaviour and serious deviant behaviour are considered against the background of normalcy. The subject content is closely inter-related with the total curriculum.

PSY 162 PSYCHIATRIC SEMINAR I (1)

Every week each student group meets with the psychiatrist to deepen their self-awareness. Problem situations in human relations arising from field-work practice and concepts of therapy and treatment are examined in the light of student experience.

PSY 261 ABNORMAL BEHAVIOUR (2)

This course of lectures is aimed at helping students to understand some of the basic causes of disturbed behaviour, emotional conflict, anxiety states and mental retardation. Some general guidance is given in the interpretation of symptomatic behaviour, and in forms of treatment and therapy.

PSY 262 PSYCHIATRIC SEMINAR II (1)

See PSY 162.

REFRIGERATION and AIR CONDITIONING

REF 10 REFRIGERATION AND AIR CONDITIONING I (5½)

Introduction to refrigeration history and development, thermodynamic functions and mechanical principles. Heat and temperature definitions, types of systems, refrigeration cycle, properties of refrigerants, handling of refrigerants, safety factors, compression system, types of components, evaporators, condensers, receivers, compressors, refrigerant flow controls, expansion valves, accessories, system servicing, charging and purging of systems. Refrigerant oils, installation procedures of special components, heat exchangers, accumulators, oil separators, water regulating valves, initial introduction to operation of cooling towers, evaporative condensers, early stages of psychrometrics; terminology and charts.

REF 20 REFRIGERATION AND AIR CONDITIONING II (5½)

Control operation, pressure and thermostatic, use of external and internal equalized valves, pressure controls, operating and limit, temperature, direct and remote applications, safety controls, D.-C. and A.-C. motors, motor controls, test instruments, motor starting devices, refrigeration piping considerations, piping installations. Water treatment for cooling towers and evaporative condensers. System contamination, cleanout procedures; acids in systems, testing and cleanout procedures, methods of defrosting, insulation factors, thermal conductivity, installation procedures, air removal, leak testing, charging, control setting, service analysis and operation. Review of silver brazing practices.

REF 30 REFRIGERATION AND AID CONDITONING III (5½)

Air conditioning fundamentals, properties of air, comfort zone, effective temperatures, relationship of psychrometric terms, use of the psychrometric chart and application, sensible and latent heating and cooling, load calculations, types of loads, use of tables, equipment selection, coils and condensing units, low temperature applications, freezing methods. Multiple systems, piping hook-up and operational requirement, multiple system accessories, evaporator pressure regulators, crankcase regulators, check valves. Centrifugal compressors, operation and service requirements. Dehydration of equipment, use of deep vacuums, survey of refrigeration principles, preservation of foods, storage conditions, temperatures, humidity, air motion, product chilling, relative humidity. Air velocity, product shrinkage, pneumatic control systems. Review of silver soldering techniques, service analysis.

REF 130 REFRIGERATION THEORY (4)

Introduction to refrigeration, description of history of trade, refrigeration fundamentals, heat and temperature definitions, vapor compression system, refrigeration cycle, types of systems, properties and handling of refrigerants, safety factors, system components, evaporators, condensers, receivers, refrigerant controls, pressure and thermostatic valves, safety controls, thermometers and gauges, accessories, lubrication, air conditioning controls and principles, humidity characteristics, heat loads, wet bulb, dry bulb readings, electrical controls, motors, starting devices, electrical servicing, installation problems, use of tables and charts, troubleshooting. (One semester)

REF 131 REFRIGERATION PRACTICE (3)

Tools of the trade, characteristics of silver brazing, brazing copper joints, brazing dissimilar metals, tube bending, practical project assignments, flaring copper tubing, compressor dismantling, identification of component parts, assembly procedure of compressors, electric motor inspection, electrical control inspection, purging, leak testing, charging systems, primary system installations, servicing installations. (One semester)

SCIENCE

SC 10 APPLIED SCIENCE (2)

Bacteriology: types and classification of bacteria, sterilization and sanitation. Anatomy and physiology: muscular nervous and circulatory systems. Electricity and light: alternating current of various frequencies, phoresis, electrical heating equipment; light rays, production, effects, classification. Chemistry: properties of common elements, acids and bases, chemical properties of cosmetics.

SHEET METAL MECHANIC

SMT 10 SHEET METAL MECHANIC I (5½)

Seams of trade-metals of trade-soldering coppers, forging and trimming copper, fluxes of the trade, rivets, cleats used in duet construction, equipment and tools, measurements, rules, tapes, etc., hand tools and their proper uses, hand operated bench machines, stakes of the trade and their uses. Basic pattern drafting; parallel line development of patterns for shop projects of the basic course.

SMT 20 SHEET METAL MECHANIC II (5½)

Shop safety, metals of the trade, new materials, bond allowances on heavy materials and aircraft sheet metal work, expansion metals, coping-flashing-metal roofing and seams used. Heating and air conditioning; meaning of air conditioning, process and comfort air conditioning; differences, control of climate, humidity and its effects, methods of heat travel, meaning of B.T.U. Methods of finding heat loss and heat gain, furnaces; history of development: 100 B.C. to now, symbols used in duct design, residential duct systems, complete layout of typical small house. Pattern drafting. Radial line development and parallel line for projects fabricated.

SMT 30 SHEET METAL MECHANIC III (5½)

Duct construction materials, fasteners used in the trade, turning vanes used in elbows, construction of high velocity duct work, air conditioning and/or ventilation: definitions, psychromatic charts, fans and fan laws, static and velocity pressure, friction losses in fittings and meaning of the equivalent length, registers and grilles and pressure losses incurred, explanation of duct sizing methods, equal friction method, static regain method, complete commercial and industrial duct layout by each method, types of equipment used. Pattern drafting advanced: radial triangulation methods of pattern development for shop projects fabricated in advance course.

SIGNWRITING

SIGN 130 BASIC SIGNWRITING AND SCREEN-PROCESS (9)

Materials used in the trade; selection and care of brushes and equipment, preparation of surfaces, lettering practice, colour theory for signwork; trade drawing, design and layout, punctuating for signwriting, introduction to heraldry and guilding, scaffolding, erection and safety measures; hand cut stencil making; operation of the process camera, line and halftone film-making; the photo-screening method of screen process reproduction; preparation of direct-screen emulsion stencils.

SIGN 131 SIGNWRITING II (10)

Advanced work in signwriting: Prerequisite SIGN 130 or equivalent.

SIGN 132 SCREEN-PROCESS PRINTING II (10)

Advanced work: Prerequisite SIGN 130 or equivalent.

STEAMFITTING

STEA 10 STEAMFITTING I (5)

General introduction, safety rules, types of tools used, use and care of tools, types of piping and fittings, standard practice of measuring piping, types of valves and gauges, types of radiators, convectors, heaters and coils, expansion and cushion tanks, types of boilers used in hot water heating systems, sizing and erection of boilers, filling, testing and operating hot water heating systems, types of hot water heating systems, gravity hot water, open and closed, two pipe forced hot water, direct return reverse return, one pipe hot water, baseboard heating, radiant heating, snowmelting, systems, upfed and downfed systems, basic principles of controls (hot water) methods of zoning systems.

History of heating, safety precautions, steel pipe, piping materials, pipe threads, thread and piping allowance, measuring pipe, type of hangers, hanger attachments, offset measuring, grading of pipe, expansion of pipe, transfer of heat, properties of water, temperature conversion, temperature and pressure, latent heat, specific heat, B.T.U. calculations, valves, types of boilers, C.I. type and sizing, convectors, unit heaters, gravity hot water systems, direct return and reverse return, piping riser and mains, radiation below mains, expansion and cushion tanks, open to closed conversion, forced hot water systems and circulating pumps, special fittings, assignment, one pipe system, up feed, down feed, air cushion tanks (forced), single circuit, double circuit, multi-circuit, balancing systems, baseboard heating, piping elevations, isometric view, radiant heating, control.

STEA 20 **STEAMFITTING II (5)**

Method of zoning, reasons, piping, template development, zoning piping, zoning special fittings, piping elevations, primary and secondary, convertor types, applications, three-way valves, properties of steam, boilers, one and two pipe steam system, steam traps, return trap system, return trap piping, return trap equipment, condensate return pump cycle, vacuum return pump cycle, recall temperature and pressure relationship, vacuum pump, piping, temple and development, accumulator tank, lift fitting and controls, sub-atmospheric system, heat balancer, control valve, differential controller, selector and thermostats, high pressure systems, high and low pressure systems, high pressure steam plants, super-heaters, economizers, injectors, condensers, etc.

STEA 30 **STEAMFITTING III (5)**

Description of steam heating systems and basic principles of cooking, pneumatic controls, air-conditioning and power house work including one pipe systems, two pipe systems, vapour systems, return trap systems, condensate return pump, vacuum return systems, high and low pressure systems, types of boilers, boiler connections, supply and return mains, stop and check valves, boiler water supply and controls, feed pumps and injectors, blow down connections, types of safety valves, types and purposes of steam traps, feed water heaters, wet and dry returns, condensate receivers, accumulator tank, vacuum pumps, pressure reducing valves, economizers, air eliminators, separators, exhaust heads, condensers, evaporators.

Review of basic and intermediate course, high temperature, high pressure, hot water systems, theory of combustion, firing, fuels, refrigeration and air conditioning, gas code and fittings, rigging, introduction to pneumatic controls.

STRUCTURAL STEEL DRAFTING

STR 10 **STRUCTURAL STEEL DRAFTING I (7)**

Force systems: components, resultants, equivalence; centroids, equilibrium, force analysis of structures; stress: axial, shear, bearing; stresses on oblique planes; working stress and factor of safety; strain elasticity; shear and moment in beams, stresses in beams; drawing office procedure; fabrication of structural steel, plain material, specifications; bolted connections; types of fasteners, shear and bearing in bolted connections; welded connections: weld types, welding symbols, stress in concentrically loaded welds. Smoley's parallel tables.

STR 20 **STRUCTURAL STEEL DRAFTING II (7)**

Moment of inertia, radius of gyration, section modulus, flexure formula, stresses in built-up beams; deflection of beams, columns: Euler's equation, empirical formulas, design of beam bearing plates and column base plates. Fasteners in combined shear and tension; stresses in eccentrically loaded welds, special beam connections. Smoley's tables, column details.

STR 30 **STRUCTURAL STEEL DRAFTING III (7)**

Combined axial and bending loads; eccentrically loaded columns; sloped and canted beam connections; moment connections; graphical and numerical stress solutions for axial stresses in trusses, truss panel point connections, bracing members, camber in trusses. Detailing of welded truss, welded plate girder, Smoley's tables.

SURVEY

SURV 100 **SURVEY COMPUTATIONS AND DRAFTING (5)**

Introduction, elements of surveying, ink drawing, mechanical lettering, Ontario Land System, bearings and azimuths, survey calculations, closures, missing courses, route location plans, topographical plans, site plans, contouring, profiles.

Calculations of bearings and azimuths, plotting angles, interpretation of legal boundary notes, plot of simple boundary, survey monumentation, plot of elevations, contours, profiles, topographic details, tracing in ink, mechanical lettering, review of trigonometric ratios of right angles, logarithms, areas, closures, D.M.D.s.

SURV 101 **PLANE SURVEYING (6)**

Fundamental principles of surveying, steel tapes, chaining methods, errors in chaining, basic construction of transit, use of transit, use of theodolite, producing line, traversing, levelling, level notes, stadia, field procedure for topographical surveying, and basic construction layout.

SURV 110 **SURVEYING (2)**

Chains, tapes, poles, pins, bench marks, hand levels, the level, use and adjustment, levelling rods, rise and fall method, level book, checks, errors, chaining, obstacles, the transit, use and adjustment, the vernier scale, measuring horizontal and vertical angles, setting out buildings, offsets, site location, quantities, contouring, zoning, subdivision plans, legal plans and calculations.

SURV 130 **SURVEYING (2)**

Leveling, contours, profiles, gradients, topographic plans and symbols, site plans, azimuths, bearings, Ontario Land System, legal, plans, ink drawings.

SURV 200 **SURVEY COMPUTATIONS AND DRAFTING (3)**

Plot from descriptions, calculations from field information, subdivision problems, vertical curves, preparation and study of all types of survey plans in various media, plot of cross-sections, earthwork calculations.

Review of fundamentals and elements, legal surveys, plans for land exchange, easement. Expropriation, survey calculations, profiles, gradients, vertical curves, cross-sections earthwork calculations.

SURV 201 **ADVANCED PLANE SURVEYING (4)**

Profiles calculating and locating all types of curves for subdivisions and highway surveys, land surveys under direction of Ontario Land Surveyor including boundary surveys; title surveys; right-of-way and subdivision surveys; theory and use of new types of survey equipment available.

SURV 202 **PHOTOGRAMMETRY (3)**

General method and theory of aerial photography, method of ground control, stereoscopic observation, mapping from aerial photographs, mosaics.

SURV 203 **SPHERICAL TRIGONOMETRY AND ASTRONOMY (2)**

Polaris observation for meridian, explanation, field procedure, calculation procedure, determination by astronomic observation of longitude, time, latitude, the Astronomic triangle, determination of the azimuth of a line, sun observation, corrections, use of tables, calculation procedures, sufficient spherical trigonometry for the solution of all above.

SURV 204 **LEGAL SURVEYING (3)**

Registry office; land titles office; history and development; types of documents and plans; government acts; expropriation procedures, plans; methods of registering; legal transfer and general procedures, deeds, description of township offices, field trips to registry, land titles and township offices.

THERMODYNAMICS

THERM 210 **THERMODYNAMICS (3)**

Energy transformations: definition of terms, the P-V diagram. Laws of thermodynamics, the Gas Laws: characteristic gas equations, work done by gases, Joule's Law. Indicator diagrams: calculation of thermal efficiencies, ideal engine cycles, comparison of engine efficiencies. Heat transfer: conduction by radiation. Entropy: changes of state, isobaric, isochoric, isothermal, adiabatic, and polytropic.

TOOL DESIGN

TD 100 MACHINE JIGS (3)

Freehand sketching and machine drafting of jig designs, emphasizing current production methods and organizations.

TD 101 MACHINING FIXTURES (3)

Freehand sketching and machine drafting of fixture designs, emphasizing current production method and organizations.

TD 102 ASSEMBLY JIGS AND FIXTURES (1)

Freehand sketching and machine drafting of assembly jigs and fixtures and welding fixtures, emphasizing current production methods and organizations.

TD 103 TOOL LAYOUTS, TOOL AND GAUGE DESIGN (1)

Freehand sketching and machine drafting of tool layouts, cutting tool and gauge designs, emphasizing current production methods and organization.

TD 200 DIE DESIGN (CUTTING) (4)

Freehand sketching and machine drafting of blanking, piercing and cut-off dies.

TD 201 DIE DESIGN (BENDING AND FORMING) (3)

Freehand sketching and machine drafting of bending and forming dies.

TD 202 DIE DESIGN (DRAWING) (3)

Freehand sketching and machine drafting of draw dies.

TD 203 DIE DESIGN (PLASTIC MOLD AND DIE DESIGN) (2)

Freehand sketching and machine drafting of plastic mold and impact extrusion die design.

TD 204 DIE DESIGN (PROCESS ENGINEERING) (2)

Company organization, estimating, time and motion study, tool economics, production control, and quality control.

WATCHMAKING

WACH 130 WATCHMAKING THEORY I (6)

From elementary to advanced techniques applied to the watchmaker's lathe and accessories; principles of design and construction of mechanical time measuring devices; theory of basic clock escapements, their function and adjustments; theory of pendulums, balance and hairspring theory; design construction of clocks; calculations of clock gearing; weights; electric clocks and electricity; mainspring operation and power.

WACH 131 WATCHMAKING PRACTICE I (13)

Development of manual dexterity in the use of small tools under magnification of the eyeloap, to fine metric measurements; hardening and tempering of carbon steel; filing. From elementary to advanced operations on the watchmaker's lathe using the various accessories; staking and removing balance staffs; truing balance wheels, poising balance wheels; colleting hairsprings; truing hairsprings in the round and the flat; overcoiling and vibrating hairsprings; installing hairsprings into watchplates.

WACH 230 WATCHMAKING THEORY II (6)

Materials, history and production of jewel bearings. The laws of friction, watch disassembly and inspection, terminology. Escapement: theory and geometry, classification, description and function. The theory of oscillatory motion and its application in horology. Sources of power supply, equalization of power. Gearing theory: production of wheels and pinions, problems in depthing, torque output through the train, calculations. Watch construction: cases, dials, movements, crystals, crowns and hands. Balance wheels, hairsprings and escapements.

Watch adjustments: to position, temperature and isochronism. Balance and hairspring theory, adjustment procedures, timing machines. Automatic and calendar watches.

WACH 231 WATCHMAKING PRACTICE II (13)

Making jewel settings, regulator repair, mainspring ends, hour wheel tubes. Pivoting, grinding, polishing and burnishing. Escapement matching, watch overhaul. Replacing balance staffs, stenis, jewels and mainsprings. Hairspring overcoiling, balance staff and winding stem making. General watch repair under conditions similar to those found in a well-run jewellery store.

WACH 330 WATCHMAKING THEORY III (6)

Complicated watches: chronografs, complete phase calendar watches, timers. Electric watches: construction, problems and repair. Elementary electricity as applied to horology. Electronic watches and clocks: Bulova Accutron, Astro-chron; Master and slave systems.

WACH 331 WATCHMAKING PRACTICE III (13)

General repair work on standard and complicated watches. Servicing electric and electronic watches. Trouble shooting and estimating. Organization of materials and supplies.

WELDING

WELD 10 WELDING (½)

Personal safety precautions, safety in handling and using oxy-acetylene equipment, welding terminology, assembly and disassembly of equipment, definition of various oxy-acetylene processes, weld joints; practical exercises in fusion welding of mild steel in the flat position using oxy-acetylene equipment.

WELD 11 WELDING (½)

Personal safety precautions, welding terminology, basic techniques used in arc welding, A.-C. and D.-C. power sources, polarity, shielded arc welding electrodes and metal transfer; practical exercises in stringer bead and weave techniques in the flat position using arc welding equipment.

WELD 20 WELDING (½)

Review of Welding 10, construction and operation of welding and cutting torches, construction and operation of regulators, weld faults; practical exercises in fusion welding and braze welding in the flat and horizontal positions using oxy-acetylene equipment.

WELD 21 WELDING (½)

Review of Welding 11, electrode classification and colour codes, factors governing the selection and use of arc welding electrodes, weld faults, arc blow; practical exercises in single- and multi-pass welding in the flat and horizontal positions using arc welding equipment.

WELD 30 WELDING (½)

Review of Welding 10 and 20, manufacture of oxygen and acetylene gases, storage of oxygen and acetylene gases; construction, handling and storage of oxygen and acetylene cylinders; practical exercises in fusion welding and braze welding in the horizontal and vertical positions, manual torch cutting using oxy-acetylene equipment.

WELD 31 WELDING (½)

Review of Welding 11 and 21, continuation of electrode classification and colour codes, plate and edge preparation, testing of welds, arc welding techniques used on various metals, review of practical exercises in 21, practical exercises in single- and multi-press welding in horizontal and vertical positions using arc welding equipment, guided bend tests performed on some weld specimens.

WELD 100 WELDING THEORY (5)

Types of welding and brazing: welding gases, types, storage, codes; metallurgy of welding, distortion, weldability of metals; testing and inspection, codes, licensing; history and development of processes; safety; power sources; design of equipment; selection of processes.

WELD 101 WELDING THEORY (4)

Shop practice and skill development. Various processes, materials, techniques including: oxy-acetylene, electric, welding; brazing, cutting; inert gas, tungsten, metal gas; pipe welding and testing, estimating; jigs and fixtures; stress relieving, fabrication, layout.

WELD 130 OXY-ACETYLENE WELDING, BRAZING AND CUTTING (2)

Safety precautions, terminology, assembly and disassembly of equipment, weld faults, maintenance of equipment, manufacture and storage of oxygen and acetylene, joint design, repair of casting, testing of welds and operators, codes, **practice:** fusion welding, braze welding, cutting with manual and semi-automatic equipment.

WELD 131 ELECTRIC ARC WELDING (5)

Safety precautions, terminology, weld faults, power sources, auxiliary equipment, maintenance of equipment, alternating and direct current, polarity, arc blow, shielded arc electrodes and metal transfer, electrode classifications and colour codes, analysis of electrode coatings, factors governing the selection and application of electrodes, storage of electrodes, plate preparation, repair of castings, arc cutting and gouging, testing of welds and operators, codes. **Practice:** welding on all joints in all positions using various types of electrodes and various thicknesses of metal.

WELD 132 WELDING METALLURGY AND DISTORTION (2)

Manufacture, composition and uses of iron, steel and other ferrous and non-ferrous metals, principal alloying elements, identification of metals, heat treatment, distortion, causes and control.

WELD 133 INERT GAS WELDING (2)

Description, safety precautions, welding equipment, welding techniques. **Practice:** welding on carbon steel sheet, aluminum, stainless steel using the tungsten inert gas process and practice welding with semi-automatic equipment using steel and aluminum filler wire.

WELD 134 PIPE WELDING (1)

Power sources, electrode specifications, pipe preparation, welding techniques. **Practice:** welding using oxy-acetylene and electric arc processes.

WELD 135 FABRICATION (3)

Preparation of plate, pipe and structural sections for welding, welding procedure, control of distortion, practical project work using pipe, sheet and structural sections fabricated to specifications.

WELD 140 OXY-ACETYLENE WELDING, BRAZING AND CUTTING (2)

Safety precautions, assembly and disassembly of equipment, cutting with manual and semi-automatic equipment, construction, operation and maintenance of equipment, handling of oxygen and acetylene gases, joint design, fusion, braze or bronze welding, brazing of various metals, testing of welds and operators, codes; practice welding, braze welding and brazing on all joints in all positions. (One semester)

WELD 141 ELECTRIC ARC WELDING (8)

Safety precautions, terminology, striking the arc, welding techniques, weld faults, power sources, auxiliary equipment, maintenance of equipment, alternating and direct current, polarity, arc blow, shielded arc elecrodes and metal transfer, electrode coatings, factors governing the selection and application of electrodes, storage of electrodes, plate preparation, arc welding of various metals, repair of castings, cutting and gouging, carbon arc welding an dbrazing, testing of welds, testing of operators, codes. **Practice:** welding on all joints in all positions using various types of electrodes and various thickness of material.

WELD 142 WELDING THEORY (1)

Manufacture, composition and uses of iron, steel and other ferrous and non-ferrous metals, principal alloying elements, identification of metals, heat treatment, distortion (causes and control).

WELD 321 WELDING (2)

Theory and practice of gas and electric welding, brazing, soldering, preparation of welds, preheating and fast-welding treatment.

BURSARIES and SCHOLARSHIPS

Many construction, industrial aand commercial companies support the College directly with the gifts or loan of highly specialized equipment. Others provide financial support for students they sponsor. In addition to this, the following bursaries and scholarship are available.

THE GEORGE BROWN COLLEGE of A.A.T. FACULTY AWARD

Each year the faculty recognizes a student who, besides maintaining a satisfactory academic and technological status, has distinguished himself by his contribution to the extra-curricular life of the college. The award is a monetary prize, determined by the Awards Committee.

THE UPPER LAKES SHIPPING COMPANY DECK OFFICER CADET AWARD — $100

Awarded annually to the deck officer who stands highest in his class in the first year

THE UPPER LAKES SHIPPING COMPANY MARINE ENGINEERING CADET AWARD — $100

Awarded annually to the marine engineering officer cadet who stands highest in his class in the first year course.

THE INSTITUTE OF PLASTICS ENGINEERING BURSARY — UP TO $100

This fund enables the College to grant bursaries to deserving students, enrolled in the Plastics Technician Course of up to $100. Applications should be made to the Registrar.

TORONTO STUDY CLUB OF DENTAL TECHNICIANS AWARD — $50

Awarded annually to the student who stands highest in his class at the end of the second year of the Dental Technician course. The award also includes a one-year membership in the Toronto Study Club.

THE FLORENCE MONTGOMERY BURSARY AWARD — $100.00

Awarded annually by the Toronto and District Branch of the Canadian Restaurant Association to the top all-round student graduating from the advanced courses.

THE CRYSTOPHANE OF CANADA AWARD — $100.00

Awarded annually by the Crystophane Company of Canada to the top all-round student of the year.

THE GORDON WRAGG SCHOLARSHIP AWARD — $100.00

To be presented to the student who makes the most important personal contribution to student life at the College while maintaining a high level of scholastic achievement.

GLOSSARY OF TERMS

CORE SUBJECTS:	courses which are compulsory within a prescribed program which leads to a certificate or diploma.
OPTIONS:	alternative courses within a prescribed program.
ELECTIVES:	additional courses taken with a prescribed program.
CERTIFICATE:	is awarded on satisfactory completion of a prescribed program of up to 40 credit hours.
DIPLOMA:	is awarded on satisfactory completion of a prescribed program of 40 or more credit hours.
ENDORSEMENT:	are credits for additional courses taken along with a prescribed program. The credit appears on the face of the certificate or diploma earned.
CREDIT HOURS:	Each course is given a rating as follows: 1 hour of classroom per week for 2 semesters (one academic year) is worth 1 credit hour. 2 hours per week for 1 semester is worth 1 credit hour. 2 or 3 hours of shop, laboratory or field work for 2 semesters are worth 1 credit hour.
COURSE:	a unit of instruction usually within one subject area for which the college gives credit, e.g., Mathematics 130 (this is a course in mathematics given to the one-year students in technical programs). Electricity 206 a (course in electricity given to second-year technicians).
CREDIT:	satisfactory completion of a course (a student, upon written application, may be granted credit for previous equivalent achievement or experience).
PROGRAM:	a selection of courses, prescribed or random, making up a particular student's course of study.

NEW COURSES

Several new courses are presently in the planning stage, some of which may be operative in the Fall of 1968. Information relative to these courses may be obtained by writing The George Brown College of Applied Arts and Technology, 21 Nassau Street, Toronto 2B or by phoning 365-5645.

BUSINESS AND APPLIED ARTS (1 YEAR)

- Accountancy
- Business Machines and Bookkeeping
- Graphic Arts (1) Letter press, (2) Typography, (3) Lithography, (4) Photo-engraving, (5) Finishing.

TECHNICIAN COURSES (2 YEARS)

- Electronic Data Processing
- Computer Programming
- Computer Analysis (3 years)
- Power Engineering

BUSINESS COURSES (1 and 2 YEARS)

- General Business
- Secretarial Arts (General)
- Secretarial Legal
- Secretarial Medical
- Business Administration

BOARD OF GOVERNORS

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Alderman Hugh Bruce — Toronto City Council
Alderman Charles Caccia — Toronto City Council
Alderman Kenneth Dear — Toronto City Council
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Professor James Ham — Dean of Applied Science and Engineering, University of Toronto
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Mr. Gower Markle — Director of Education and Welfare for the United Steelworkers of America, Toronto
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JEWELLERY ARTS ADVISORY COMMITTEE

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Mr. K. Saalmans	Saalmans Jewellers
Mr. T. R. Smith	Maurice J. Walsh Limited
Mr. L. Wenger	Siffari Jewellery Company
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Mr. J. Gray	Ontario Department of Highways
Mr. E. W. Petzold	Ontario Department of Highways
Mr. W. Ratz	Ontario Department of Highways
Mr. K. Skinner	Ontario Department of Highways
Mr. R. A. Smith	Metropolitan Toronto Roads Department
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Mr. R. Scott	Department of Labour, Ontario

TEACHING STAFF

NASSAU CAMPUS

Adamson, C. W.	Fd. Serv.
Amey, C. A.	Academic
Apodaca, J. R.	J. Arts
Barnum, D. E.	Drafting
Beetles, B. H.	Academic
Bennett, C. E.	Drafting
Betts, G. A.	Welding
Bishop, D.	Academic
Blain, J. P.	Drafting
Blizzard, L. A.	Academic
Boles, J.	Electrical
Bordonaro, C.	Welding
Bosen, L.	Academic
Bourbeau, G.	Fd. Serv.
Bradley, F.	Sh. Metal
Brennan, P. A.	Academic
Buck, A. J.	Fd. Serv.
Campbell, A.	Welding
Carr, Wm.	Drafting
Chadwick, A. C.	Academic
Clayton, A.	Sh. Metal
Cook, G. F.	Academic
Coupland, H. G.	Drafting
Csorgeo, E. T.	Academic
Davies, A.	Pt. & Dec.
Dawson, H.	Elect.
Dejong, F.	Signwriting
Devenney, J. T.	Drafting
Dodds, R. G.	Electronics
Doyle, L. P.	Academic
Drake, V.	Phys. Ed.
Dykstra, W.	Electronics
Ekeland, N. R.	Guidance
Emery, B.	Steamfitting
Engelhart, F.	Academic
Ernst, A. W.	Academic
Facca, J.	Welding
Farquhar, A.	Welding
Faul, G. W.	Instrumt.
Field, I.	Barbering
Filice, A.	Elect.
Fleming, G. E.	Academic
French, R.	Electronics
Gildemeester, J. H.	Plumbing
Goertzen, J.	Academic
Gordius, E. W.	Guidance
Gordon, W. R.	Electrical
Gould, E.	Drafting
Green, S. C.	Drafting
Hague, J.	Academic
Hammond, F. H.	Academic
Hancock, J. H.	Welding
Harris, J. T.	Academic
Hawes, J. C.	Academic
Herrington, J. R.	Sh. Metal
Hoefner, F. W.	Electronics
Holenstein, K.	Drafting
Holmes, E. W.	Drafting
Houghton, W. R.	Electrical
Hughes, T. W.	Drafting
Hutchison, C. J.	Barbering
Imeson, H.	Academic
Irving, I. G.	Plumbing
Jason, G.	Drafting
Kay, R. W.	Drafting
Kerman, M.	Fd. Serv.
King, Mrs. R. R.	Hairdressing
Kling, E.	Electrical
Lepage, G. G.	Academic
Linzon, E.	Academic
Lister, F. A. C.	Academic
Low, J. C.	Electrical
MacKay, N.	Plastering
MacLennan, K.	Vice Prin.
MacLeod, N. W.	Academic
Martel, A. J.	Electrical
Mapp, M. C.	Academic
Martiuk, S.	Electronics
Mason, C. A.	Drafting
Mateju, L.	Elect.
Matthews, D.	Electronics
McCallan, T. E.	Electrical
McDougall, S. M.	Librarian
McIntyre, J.	Carpentry
McLaren, D.	Masonry
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Mitchener, H. G.	Electronics
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Muma, J. L.	Academic
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Nagy, A.	Drafting
Nolte, B.	Baking
Oberwasserlechner, A.	Welding
O'Reilly, J. A.	Instrumt.
Ostan, A. R.	Drafting
Panetta, F. D.	Electrical
Paterson, C. D.	Electrical
Patrick, K.	Instrumt.
Pearce, R. F.	Electrical
Perkins, P.	Carpentry
Pert, J. C.	Drafting
Plumer, F.	Fd. Serv.
Polak, J. J.	Fd. Serv.
Pound, R. A.	Drafting
Power, J. J.	Instrumt.
Quance, D.	Plumbing
Quinney, M. W.	Drafting
Ralph, W. G.	Signwriting
Rau, D.	Sh. Metal

Richards, P.	Ironworker
Richardt, K.	Fd. Serv.
Rugole, J.	Watchmaking
Sawodny, K.	Fd. Serv.
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Schwanbeck, R.	Drafting
Schwenger, M. B.	Watchmaking
Scott, R. J.	Academic
Schroder, R.	Refrig.
Skornschek, H.	Welding
Slattery, Mrs. B.	Hairdressing
Smith, R. G.	Academic
Snider, S. W.	Hairdressing
Sokur, I.	Fd. Serv.
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Teng, J.	Electronics
Teng, T.	Electronics
Thompson, J. H.	Refrig.
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Todd, D. J.	Plumbing
Tremain, E. L.	Masonry
Valenzuela, F.	Hairdressing
Vent, W.	Drafting
Waites, R. H.	Drafting
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Walton, W. M.	Even. Cl. Sup.
White, B. M.	Electronics
Wincott, W.	Steamfitting
Wood, W. L.	Lathing
Young, W.	Plumbing
Zavitz, E. C.	Electrical
Zessner, W.	Electronics
Ziegler, R. E.	Electrical

OFFICE STAFF — NASSAU CAMPUS

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Beairsto, Mrs. R.
Carr-Locke, P. A.
Cross, Mrs. C.
Daly, Mrs. T.
Dudgeon, F. A.
Dutrisac, Miss F. M.
Edwards, Mrs. J.
Fraser, D. A.
Hamilton, Mrs. H. M.
Kempkens, Mrs. E.
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Larkin, H. G.
Niamat, Miss F.
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Vieira, A. D.
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Brown, T.
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Crown, H. R.
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Fogarasi, T.
Heeley, E. C.
Jefremow, G.
Kobluhuz, M.
Koolme, U.
Koopu, E.
Kostjak, J.
Kover, K.
Kuhn, H.
Luht, V.
McCartney, W. G.
McGuire, P. J.
Porter, O. B.
Prants, E.
Rose, W.
Rowlison, C. C.
Simpson, J. J.
Skripnik, J.
Soosaar, E.
Starasts, H.
Tracey, G. C.
Varga, L.
Viersen, H.
Wieckowski, A.
Warne, C.

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Gambrelis, Mrs. R.
Hillier, Mrs. A.
Kuowcy, J.
Madsen, Mrs. R. M.
Paumier, Mrs. J.
Pietowski, J.
Seimuskins, I.
Neilsen, Mrs. R.
Xuereb, J.

TEACHING STAFF — Dartnell Campus

Andrews, B.	Machine Shop
Andrews, Miss I.	English
Barbour, A.	Marine
Behram, R.	Marine
Bradley, K.	Mathematics
Buchan, T. R.	Appliance Servicing
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Crawford, W.	Drafting
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Kake, V.	Marine
Lendor, K.	Machine Shop
Lewis, D. A.	Electric Motor Repair
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Macatee, M.	Machine Shop
Mason, W.	Design
Miodonski, E.	Marine
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Nicholls, K.	Teaching Techniques
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Pritchard, H. R.	Dept. Head
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Screech, R.	Marine
Smith, J. M.	Marine
Stuckey, J.	English
Sykes, M.	Principal
Tarpley, G. R.	Appliance Servicing
Thiessen, L. I.	Marine
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Thomsen, R.	Design
Vander Geest, H.	Business Machines
Vile, J.	Child Care Workers
Wilson, D.	Plastics Technician
Winchuk, W.	Machine Shop Dept. Head
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Wolfman, J.	Mathematics
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